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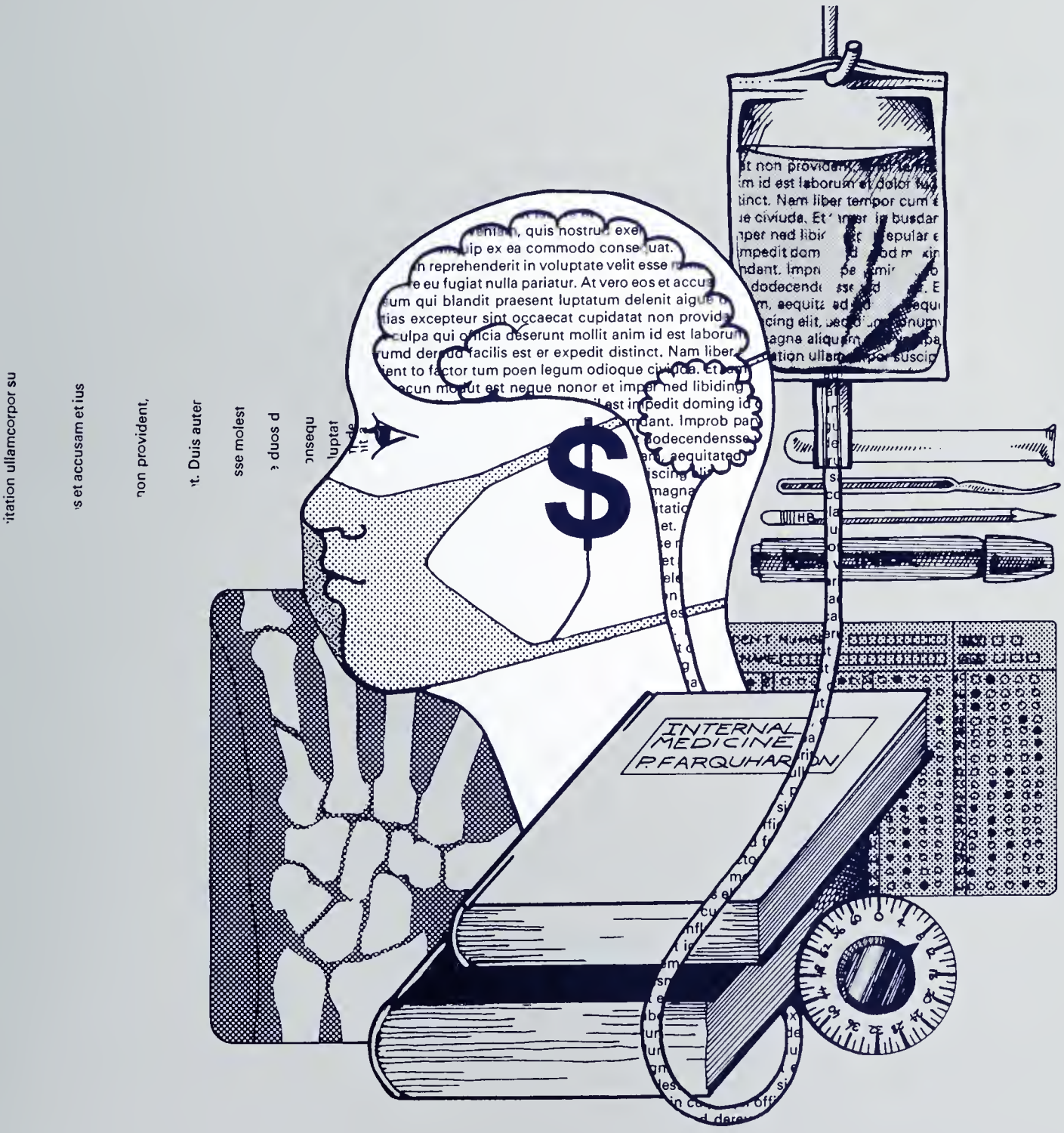

In this issue:

Evolution and Renewal of the Undergraduate Medical Curriculum
by Dr. E.M. Sellers

Arts and Letters Creative Writing Contest

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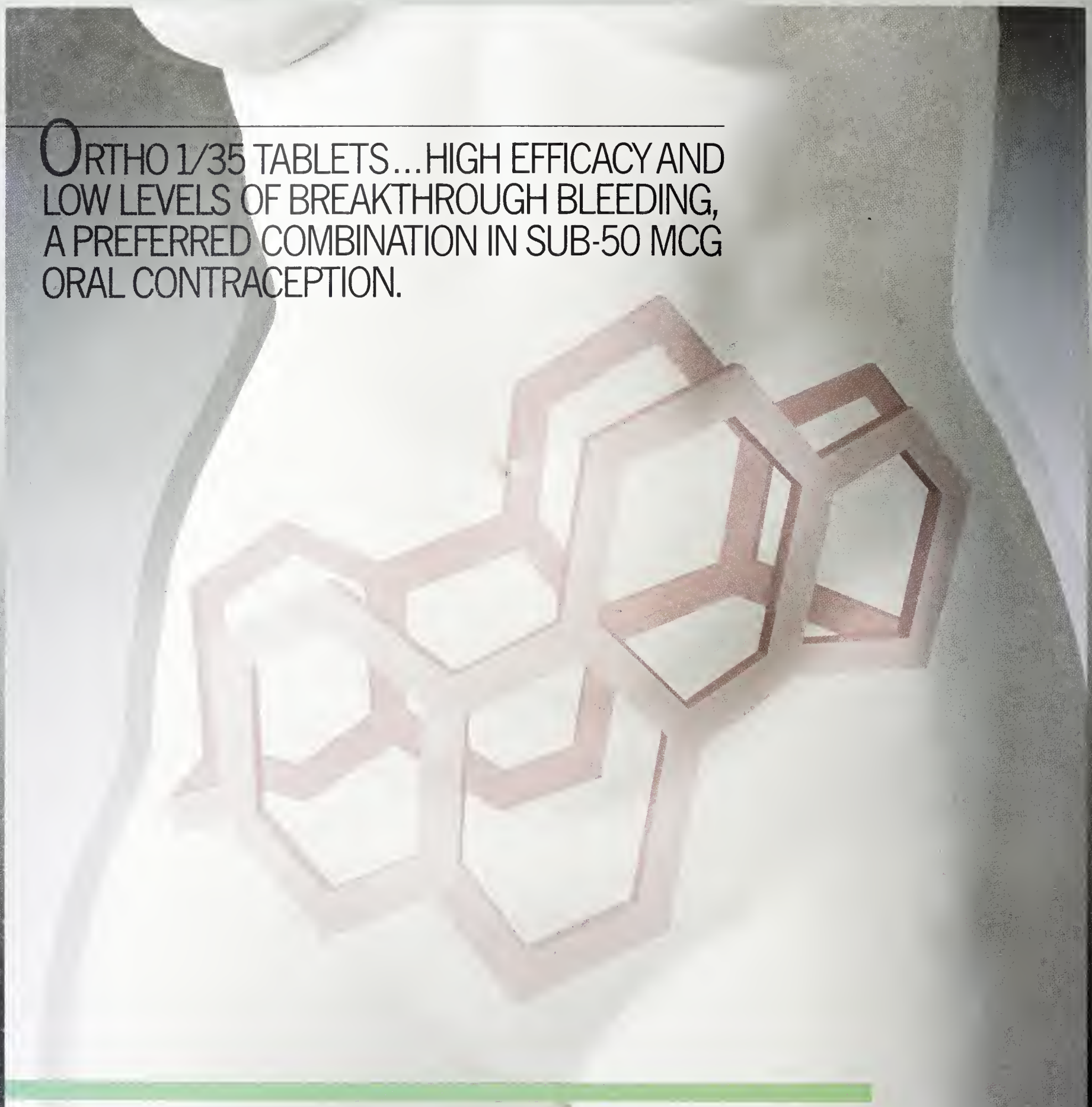

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GUIDELINES FOR PUBLICATION

1) All articles intended for publication should be submitted to the editors before the deadline which is usually six weeks before the release of the Journal.
2) Submitted articles should be typed double-spaced, single sided on paper 8½"x11" (letter size) and they should not be more than 15 to 20 pages (3000 to 4000 words).
3) Illustrations, graphs, diagrams and figures should be put on a separate sheet and identified by Arabic numerals. A list of explanatory legends for all the figures and diagrams should be put on another sheet. Do not write on the back of photographs.
4) References should be checked with the original sources, designated by raised Arabic numerals in the text, and listed in alphabetical order on a separate sheet. Each periodical reference should include in order: the author's last name and initials, title of the article, journal name, volume number, page number, and year (e.g. Risser JC: Scoliosis: Past and Present. *J. Bone and Joint Surg* 46A:167, 1964). For further information please consult the MLA Stylesheet.
5) The editors reserve the right to make such editorial changes as are deemed necessary to ensure correctness of grammar and spelling, clarification of statement and conformity to Journal style.
6) Acceptance for publication is subject to the understanding that such material is submitted solely to the Journal and will not be reprinted without the consent of both the editors and author.

EDITOR'S MESSAGE

Finding Our Medical Identity

This is the fourth and last issue of the University of Toronto Medical Journal for 1982/83. In it there appear three important articles dealing with the issue of undergraduate medical education — something which affects us all directly.

Dr. Edward M. Sellers is an Assistant Dean of the Faculty of Medicine, and is affiliated with the Departments of Pharmacology, Medicine, and the Addiction Research Foundation. He is also chairman of the Undergraduate Medical Curriculum Committee, and in this latter capacity, has contributed a detailed and informative article on the nature and scope of medical curriculum renewal. The historical aspects of systems teaching, the philosophy and current situation of the undergraduate curriculum, and the issue of a Core Curriculum are discussed.

The last question is further addressed by Philip Hébert, a third year student, whose article focuses on the plethora of information medical students are required to absorb, digest, assimilate, and regurgitate, and the inherent weaknesses of a teaching system based solely on these narrow principles. One answer to this dilemma is to establish a Core Curriculum, whose function would be to mitigate the escalating burden of information overload, and simplify and consolidate the approach to medical education. Such an option is currently being examined by the Undergraduate Medical Curriculum Committee.

At the heart of this issue dwells the question of our identity as medical students. From day one of medical school we are mentally squeezed, poked, prodded, and hammered into the mould of medical doctor. Medical education consists of more than just the sum total of all medical knowledge, and in the long run the philosophy and attitudes we acquire towards illnesses and suffering are just as important as the 'facts' on which we base our treatment. A course in the medical humanities can barely scratch the surface, and this is the theme of an article by Linda Harvey, a second year student.

Ultimately, it is the task of the individual medical student to confront the issue of his own medical identity. The choice, as Harley Hahn points out in the last article of this issue, rests with the individual himself.

As is customary at this point, I would like to thank some of the individuals who helped make this an outstanding year for the Medical Journal: the executive staff (Dele Davies, Eric Grafstein, Lora Hamilton, Linda Harvey, Doug Kondziolka, Liz Keay, and Sal Sirna), our advisory staff (Davy Cheng and Paul Boughen), Michael Bazos our advertizing director, Harley Hahn our resident sage, the Art as Applied to Medicine people (Rhonda Legrove, Kate Santos, Elizabeth Gilbert, Leila Lax, and Pat Farquharson), and most important, Mrs. Randall, secretary to the Medical Society, for her perrenial cheerfulness and maternal radiance. The layout of the Journal has been completely re-designed this year, thanks to the excellent work of Joseph Burdzy and Lisa Levitt of IMS. As well, thanks go to our typesetters, Instructional Media Services and Media 1 Graphics, and to our printer, Letter Perfect Press, for their flexibility and patience around deadlines. A number of IMS staff have been particularly helpful and deserve a special thank you: Tiiu Kask, Liivi Currier, Joanne Boucher, Marici Dillon, Nigel Allen, Silva Tratnik, and Barbara Boughen. Finally, the Medical Society, for their continued support throughout the years.

On a personal note, I would like to thank the Medical Society for having me as editor this year. Hopefully there have been some improvements in the Journal over previous years. My goal last June was to match the quality of this publication to the high caliber of the articles submitted by the students of our faculty, and it has been a challenge and a pleasure meeting this task.

Michael Dan
Editor

Illustration by Rhonda Legrove, 8T3, Art as Applied to Medicine

GUEST ARTICLE

Evolution and Renewal of the Undergraduate Medical Curriculum

Edward M. Sellers, M.D., Ph.D.*

"evolution n. (L. *evolution-, evolutio* unrolling)
1a: a process of change in a certain direction. b: the action or an instance of forming and giving something off. c (1): a process of continuous change from a lower, simpler, or worse to a higher more complex or better state. (2): a process of gradual and relatively peaceful social, political and economic advance ...6: a process in which the whole universe is a progression of interrelated phenomena —..."[1]

A medical curriculum must be subject to continuous review and improvement in order to respond to new needs in medical education and to improve the effectiveness of existing programs. The undergraduate medical curriculum at Toronto is no exception to such a process of review and change. In general, changes have been evolutionary but at least twice in the past 15 years major revisions have occured.

Historical Perspective

Until the mid 1960's, undergraduate medical education was organized primarily on a departmental basis with a 'classical' curriculum design. The course was 4 years long; each week included 5-5½ days of teaching; no elective time or clerkship existed. During the late 1960's a major curriculum review was instituted to provide better integration of teaching, more flexibility in the learning experience, and to respond to wishes for increased teaching and hospital autonomy. Many other changes in education and health care delivery impinged on this process. For example systems-based teaching was viewed as a panacea to curriculum problems by students and many medical schools across North America. The important changes instituted at that time included: addition of a fourth year clerkship year, identification of elective time, prolongation of the school year by 4-5 weeks, and the integration of departmental and teaching into systems. Some of these changes or outcomes have been retained since then because of their success.

Despite the *a priori* appeal of the shift to integrated teaching by systems, such an approach was associated with serious logistical and administrative problems. Among these problems were a disarticulation of the existing departmental administrative structure from the operational side of curriculum delivery, a disproportionate amount of centralized teaching, a severe strain on the hospitals created by 'blocking' because of the difficulty in finding enough patients in a particular 'system' on a given day, and breakdowns in communications because the curriculum organization ran counter to the existing departmental structure.

A major revision of the curriculum was approved in 1975 to attempt to rectify these problems. Among the changes made at that time were:

1) To transfer scheduling of clinical teaching time to each of the general teaching hospitals. This permitted each hospital to optimize patient availability since each hospital had the option to block or stream subjects as they wished.

2) To add selective time to the clerkship.

3) To employ departmental organization for subjects most suitable for this approach (e.g. Anatomy) and to employ an integrated or systems approach for ones where separate departmental committees seemed cumbersome e.g. neurosciences, cardiovascular, respiratory.

4) To organize the curriculum on a modified matrix management system requiring input from system or subject, hospital and department.

5) To introduce a number of subjects not previously included in the curriculum e.g. Addictions, Clinical Pharmacology and Therapeutics, Medical Jurisprudence, etc.

Since that time a number of further evolutionary changes have been made. For example movement of Ophthalmology to Year 03 from the clerkship; addition of topics in Human Sexuality, Emergency Medicine, and Geriatrics; development of the MD-Ph.D. program; development of Comprehensive Exams for Year 03 with a decrease in number of exams and exam hours and improved education quality; a shift in Pediatrics to Year 03 (to occur in 83/84); development of a central lecture series in Psychiatry; development of an interviewing course as part of Clinical Methods Year 02; piloting Medical Humanities experimental course in Year 01; appointment of an Electives Coordinator; and reserving of time for special lectures in curriculum time, e.g. Gairdner Lectures, etc.

Present Organization of the Curriculum

The planning, coordination, conduct and evaluation of the undergraduate medical curriculum are the responsibility of the Undergraduate Medical Curriculum Committee (UMCC). This Committee is a standing committee of Faculty Council by whom all substantive curriculum changes must be approved. In addition, all changes in academic programs must be approved by the Curriculum and Standards Sub Committee of the Academic Affairs Committee of the University of Toronto's Governing Council.

The UMCC appoints Systems, Subject or Topic supervisors and committees and Hospital Coordinators who are responsible for the planning, conduct, coordination and examinations in their subjects. In addition the UMCC appoints Hospital Coordinators to run the hospital based teaching program for Year 02, 03 and 04.

*Departments of Pharmacology and Medicine and Addiction Research Foundation Assistant Dean, Undergraduate Medical Curriculum

While Faculty administration is generally run on a departmental basis this is not always optimal for educational purposes. As a result 3 models for organizing or curriculum exist:

Subject e.g. Anatomy; Surgery in the Clerkship (Year 04). This model is used where all teaching comes from one department.

System e.g. Cardiovascular (Medicine and Surgery), Genitourinary (Medicine and Surgery). Used when it is important to ensure coordination of two or more departments.

Topic used when the teaching area is multidisciplinary or crosses a number of systems or subjects. Topics often cover two or more years within the curriculum and are formed by seconding time from existing Subjects or Systems, e.g. geriatrics, human sexuality.

Philosophy of the Curriculum

Our curriculum is based on the premises that medical education is a life-long process; that all existing medical knowledge and skills can not be conveyed in a four year program; that biomedical knowledge is continuing to expand; that medicine and the community have an increasingly intimate and complex relationship; and that the curriculum must be continuously reviewed, revised and updated in response to new needs and problems.

Our objectives are to fashion a climate for learning which will develop the full potential of each student; endow the student with knowledge, skills, values, attitudes and professional and ethical principles basic to the furtherance of any career in medicine; instil a desire and capacity for continuing self-education; make the student constructively critical of all he sees, hears, or reads so that he may adapt the valid and discard the questionable; instil in the student a determination to provide conscientious care with scientific and clinical excellence without losing a sense of compassion and sympathetic understanding; make the student aware of the function and the need for co-operation with the other health, welfare and educational agencies in the community available to assist him in caring for his patients; and make the student aware of his responsibilities not only to the individual patient but also the community at large in terms of the socio-economic and cultural setting in which medical practice is carried on.

We believe the curriculum should be an integrated unit and not a series of hurdles to be surmounted and left behind; present an orderly progression of relevant information, knowledge and skills; emphasize the interdependence of the biological, behavioural and clinical sciences; and recognize the variations of premedical backgrounds, and individual interest of students and choices of future careers in medicine.

Future Steps

The UMCC recognizes that we have not achieved all these objectives and that in addition a number of potentially serious cracks are appearing in the curriculum infrastructure. The committee has felt that sufficient attention has not been paid to ambulatory teaching, critical thinking skills and problem solving. In addition, over the past three years the UMCC repeatedly has heard concerns voiced by students and Faculty about fact overload, examinations, the inadequate clinical competence of our students, student stress, and fragmentation of teaching. With respect to curriculum revisions, the Committee has found it increasingly more difficult to introduce new topics into the curriculum despite their apparent importance, e.g. Emergency Medicine.

Because of these concerns the Undergraduate Medical Curriculum Committee proceeded to develop a process which could result in improvements in the curriculum. This was done with a number of premises in mind:

1) The undergraduate curriculum is fundamentally sound with many examples of excellence in undergraduate medical education.

2) Our strengths include high quality students; many Faculty of international stature in research and education; a strong research-based Faculty; large and varied Electives Programs; well equipped teaching hospitals of national and international reputation; large patient population; and a remarkable richness of faculty resources which permits us to develop programs not easily developed at other schools.

3) Faculty members and students are committed to improving education and training.

4) Major changes in the curriculum should not be made without careful justification and thought. A substantiated expectation of benefit must be part of any curriculum change. Some of the wrong reasons to make changes include: change for change's sake; popular causes that come and go; territoriality; personal power traps: "I demand that it be done this way!"; starting post-graduate specialization at the undergraduate level!

5) Curriculum Renewal is a complex process which requires gathering information from many sources, reviewing the information, and formulating comprehensive or thematic solutions rather than tinkering.

6) The objectives of the undergraduate medical curriculum of the Faculty of Medicine, though written over ten years ago, are still valid and have not all been fully achieved.

With these premises and concerns in mind the UMCC sponsored a Faculty - Student Curriculum Renewal Workshop on June 5, 1982. About 100 persons attended to discuss 8 theme topics. From these, 8 reports were prepared which have served as the basis for subsequent UMCC action. Table 1 provides a condensed "problem list" of the curriculum. (the full list has more than 25 items and is available on request). Since June many steps have been taken. Some of these include:

1) Submissions to the UMCC have been made on selected topics, e.g. oncology, geriatrics, critical appraisal/statistics, ENT, medical humanities.

2) Establishment of UMCC Subcommittees, e.g. Basic Sciences, Research, Ambulatory Teaching, Examinations.

3) General requests to all Subject and Topic Coordinators to submit proposals for changes in their teaching programs.

4) Meetings with Subject/Topic Supervisors, Students, Hospital Coordinators, Departmental Chairmen.

5) Preparation of Report for LCME Accreditation Team Visit.

6) Distribution of survey questionnaires on essential knowl-

edge skills, personal qualities, values and attitudes to hospital coordinators, each and medical student class, and subject supervisors.

During this Spring the UMCC will be meeting weekly to consider various other submissions.

Timetable for Curriculum Renewal

The UMCC expects to have completed its primary review of the curriculum by May of 1983. During the summer various proposals will be developed which will be discussed widely in the faculty. In the early fall we hope to have another Faculty - Student Development Day to discuss the proposals. Final revisions and approval should be complete by January 1984 in order that changes can be made for September 1984.

Evolution of Revolution: Outcome of Curriculum Renewal

Since the information gathering phase of curriculum renewal is not complete, detailed speculation is inappropriate. Obviously we hope that we will be able to come up with effective solutions to the identified problem areas without detracting from the many strengths we have. The words of Petronius Arbiter (200 B.C.) are germane in this context:

> "We trained very hard ... but it seemed that every time we were beginning to form up into teams we would be reorganized.
>
> I was to learn later in life that we tend to meet any situation by reorganizing, and a wonderful method it can be for creating the illusions of progress while producting confusion, inefficiency and demoralization."

The process of curriculum evolution is complex and should be orderly. We must be sure that the cure is better than the disease! Virtually none of the items on the "problem list" can be considered in isolation from others. Sometimes one approach that may work in a small medical school is not feasible or effective in a school with 250 students per year and 7 general teaching hospitals. This does not mean that unfavourable compromises must be made, but rather that our solutions must be unique to take advantage of our strengths. For example with 7 general teaching hospitals each with its own strengths, one can offer all students something different and special but you can not easily have an identical program for all. As long as the essential experience is the same then perhaps medical education is enhanced by taking advantage of the flexibility available. Similarly if you believe that all students should have an identical education experience then you try to develop a program that meets the minimal needs of all students. A predictable outcome of such an approach among 250 students with diverse backgrounds of high achievement is that you will have substantial numbers of students not getting what they need or want. An alternative tactic is to let students have some options within the formal curriculum. Why not let students pursue their interests and strength by giving them a limited role to select their direction and level of "core" curriculum? The Behavioural Science demonstration program for 40 students in Year 02 is one example of such tailoring. Such an approach if extended to more sophisticated models could offer students and faculty many advantages.

A final matter to consider is that curriculum changes can usually only be introduced gradually in order to ensure that students currently in the system do not miss or repeat essential teaching or that Faculty do not 'burn out'! Recall that a shift of a subject from Year 03 to 02 means that the subject must be taught twice by the same teachers in the same year. Similarly development of a new program for entering students may mean that teaching of the 'old program' by the same teachers may have to continue for as many as 3 classes of students completing medical school. Teaching capacity is finite! In general one should anticipate a phasing in of curriculum changes over a 2 to 4 year period.

I believe we will be able to satisfactorily address the fact overload problem through a combination of steps involving: reduction in emphasis on multiple choice questions; increased emphasis on educational experiences that are qualitatively different than lectures; development of in-course evaluation techniques that relate to the purpose of such educational experiences, e.g. term papers; problem solving exercises; and reducing lecture time and syllabus size and limiting textbook recommendations in selected subjects or systems. One would hope that such changes would communicate different priorities than those presently understood and would decrease student stress. However, even with such changes medical school will not be a vacation!

Further speculation on the outcome of curriculum renewal is inappropriate at this time. I look forward to discussing various proposals with you over the next months and to reporting next year on 'Curriculum Renewal Completed'. I will undoubtedly conclude my report by pointing out that we are already entering the next phase of curriculum evolution!□

Table I. Curriculum Areas Under Review

1. Fact Overload
2. Examinations
3. Information processing and critical thinking skills
4. Community and ambulatory based teaching
5. Student stress and effects of curriculum change on students
6. Selection, development and renewal of faculty as teachers
7. Introduction of new topics, systems or subjects
8. Continuity of faculty and student contact
9. Administration and coordination of curriculum; effective communication about the undergraduate program.
10. Admission requirements
11. Role of teaching hospitals with on-site basic science research programs.

References

1. *Webster's New Collegiate Dictionary* Thomas Allen & Son Ltd., Toronto 1977

Recommended Reading

Journal Medical Education — Published monthly

Kerr C. *The Uses of the University* Harvard University Press, Cambridge, Mass., 1982

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Furnishing and equipping the office:

Determining your needs – buying vs. leasing – when will the equipment pay for itself – office security...

Where to go for business advice:

Finding a good accountant – how many lawyers should you have – who will provide the best tax advice – guidelines for selecting a stock broker and insurance agent – when to call a management consultant...

Assessing your insurance needs:

Protection from malpractice – what type of life insurance to buy – disability – insuring your business property...

Financial management and reporting:

Developing a good accounting system – measuring profitability and performance – protection from embezzlement – billing and collection procedures – taxation and the professional...

Getting the help you need:

Working through others – when and how to delegate – determining the type and number of employees – recruiting techniques – how much should you pay...

Maximizing staff effectiveness:

Motivating people – the importance of leadership – establishing standards of performance – measuring results – special problems...

Maintaining employee satisfaction:

Investing in ongoing training – establishing two-way communication – ensuring your office policies are followed – getting employees off to the right start...

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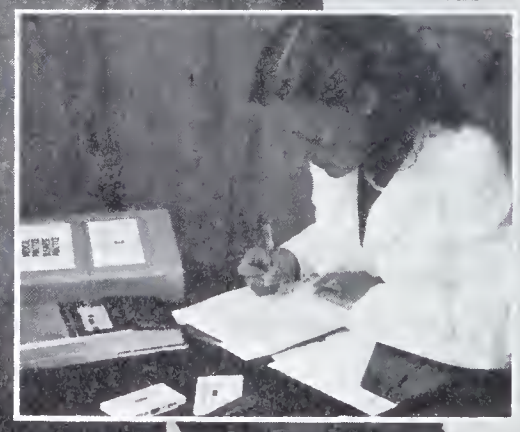

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MEDICAL EDUCATION

Criticism and Conformity in Medical Education

Philip Hébert 8T4

The Dilemma

"Now, what I want is, Facts. Teach these boys and girls nothing but Facts. Facts alone are wanted in life. Plant nothing else, and root out everything else. You can only form the minds of reasoning animals upon Facts: nothing else will ever be of any service to them."

Thomas Gradgrin in *Hard Times*
by Charles Dickens

Traditionally, medicine was practised as an art or craft, the virtues of which depended upon the special and esoteric powers of its healers. In the past century or more this idea has been increasingly replaced by the idea of medicine as a science. I want to look at some of the limitations of this view, especially as regards medical education. I will suggest that medicine has in part adopted the *appearance* of science and in so doing has done a disservice to its education. In the second section I will suggest some alternatives that might make medical education a more enjoyable enterprise.

Medicine's turn to science has brought unquestionable benefits to humanity. Replacing the private proclivities of healers with the public discipline of experiment has made it possible for medicine to learn from its errors. Medical practice itself cannot be scientific, however, for it must apply the teaching of science to the therapeutics of *individual* patient care. In this sense, medicine must overleap the always tentative state of pure science in the interests of practical action. Medicine faces risks in patient care and so must demand of its teachings a degree of reliability and success that theoretical science need not.[1] Like the church in former times, medicine has come to be the central social institution dealing with questions of suffering and death. The social role medicine must play puts an impossible strain upon it — in its leanings toward science it must admit the tentative and desultory character of its findings; in its leanings towards therapeutic action it requires infallibility and unequivocalness.

The rift here leads those uncomfortable with uncertainty to look to the social structure of medicine to soothe their worries. Authoritarianism — the practice of foregoing autonomous decision-making in favor of following the practice of others — runs rampant in medicine. This practice not only exacts a price of unimaginative patient care, it also stunts us as human beings. As Mill once wrote,

> "He who does anything because it is the custom, makes no choice. He gains no practice in discerning or in desiring what is best. The mental and the moral, like the muscular powers, are improved only by being used."[2]

The need for certainty in medicine has, I think, also led to a mistaken idea about science. For it is supposed in many quarters that science is *not* a tentative enterprise and that its teachings can be relied upon to dispel uncertainties concerning patient care. Thus, there is some kind of hope that scientific observation alone will serve as a 'bedrock' for medical judgement. To obtain "a complete, objective idea" of a patient's case, we are instructed to "observe him in the same way we observe the stars or a laboratory experiment".[3] Doubtless we always need to know the particulars concerning a patient; but it should not be thought that if we are methodical or scientific enough our findings will be indisputable. From the most mundane level of striving to hear those distant heart sounds or straining to see the shadows of physical lesions on X-rays, the amassing of facts is always beset by interpretation. And where there is interpretation, there is also the possibility of challenge and dissent. Facts are no more secure than the theories that interpret them and the history of science is replete with as much factual review as theoretical change.[4]

The mistaken idea about science in medicine is not only that science is a secure enterprise — which of course deprives it of much of its excitement and joy[5] — but also that science demands conformity and consensus. Science is much more diverse than many imagine and there is almost never unanimity even about matters of fact. It would serve our medical educators well to remember this, for in medical education today we are witness to the 'tyranny of facts'. There has been a proliferation of factual information in our education that goes beyond the capacities of the anyone to master. The supposition seems to be that only if we devour these masses of the latest information can we really be 'scientific'. This is a travesty of science, of course, for it comes to privilege the mind-numbing memorization of facts over the imaginative enterprise of critical thought and inquiry. This way lies conformity and medical practitioners unable to think sufficiently for themselves.

For one way of suppressing thought and a consideration of alternatives is to so overwhelm students with 'the facts' that they have no time to critically digest them. We are expected to recall reams and reams of facts for exams, modelled on, it seems, 'trivial pursuits', that *as everyone knows* will be forgotten as soon as the exams are over. The emphasis upon multiple choice exams as well encourages examiners to dream up minutae of information that is often of little clinical or scientific relevance. And of course, *as everyone knows*, one passes such exams by redoing previous years' exams so one may glean the gems of trivia that fascinate examiners. Learning how to write an examination in medical school comes to be a central preoccupation of many. It not only leads to cynicism but is also paid for at the expense of being a good medical practitioner. Here the type of examinations we have — based on an overly reverential attitude toward the 'facts' — comes to determine the nature of our education — a case of the tail wagging the dog, if there ever was one!

This uncritical aping of the appearance by medicine leads then to a radically limited notion of education. For it leads us all too often to possess a wealth of information whose basis

we do not understand and whose consequences we do not comprehend. Even if this information were true, it is thereby cleaved to as a superstition, for it amounts to beliefs held independently of argument. To really understand a position, Mill argued, it is necessary to know alternate interpretations which, by contrast, throw into relief the outlines of our own beliefs.[6] Without a knowledge of significant alternatives, our positions are held uncritically and superficially.

The upshot of this uncritical acceptance of information is that it leaves us defenseless before criticism when significant alternatives do arise in our midst. How many of us really can argue against herbal medicine or chiropractic say, rather than simply dismissing them? (In so dismissing alternatives, we are relying on the institutional weight of medicine rather than arguments in its favour.) The dismissive attitude engendered by our education maims our imagination for it makes us unable to incorporate insights from other traditions. Rather than seeing the helpful role alternatives may provide, modern medicine ends up adopting a defensive and hostile role towards them. This conservative attitude reinforces the social authoritarianism of medicine and results in a tyranny of the mind as effective as many state-supported ideologies. The end result is a practice of medicine that is not as good as it could be. Medicine has made great advances. But it could do better. What I have tried to suggest so far is that it can do better if it corrects its attitude toward science and changes its education. In the following section I will make some suggestions for how our education might be different.

Some Alternatives

Straight away it should be said that medicine alone is not responsible for the nature of its education and practice. As I have tried to suggest above, there are strong social pressures on medicine to be a conforming and infallible enterprise. Many people are unable to make decisions for themselves and look to doctors as their guides.[7] This may be harmless enough. Where people are disenfranchised in so many areas of their lives, it is too much to expect that they can be self-directing as far as their health care goes. But I don't think this gives doctors a license to make decisions willy-nilly for people We should strive to do our utmost to give to our patients, where they are capable of it, the means to direct their care. Paternalism may be an acceptable practice for some patients but it should not be the norm.

Nevertheless, there are some changes in our education that could make it better than it is. There is no question that one great central dilemma lies in the mind-benumbing proliferation of facts in medical education. It is essential if we are to have a more critical and less conformist education to check this so far relentless factual proliferation. One suggestion that has been rightly raised by others is the development of a core curriculum. Ideally such a curriculum would be the focus for all our education. It would have to winnow our courses down in size and would best do so if it used the fine comb of clinical relevance. This is not an argument for pragmatism. It is just the opposite: only by reducing the size of our courses — their tendency to become independent beasts — can we be better educated and less wedded to uncritical acceptance.

A core curriculum would seek to define (a) the essential courses a doctor must know well, and (b) the essential principles a doctor must understand to master a course. Thus, rather than emphasizing factual misery, teaching would emphasize principles of factual selection and organization. Rather than thinking it necessary to teach everything about an area several times over in several years, the emphasis would be on ways and means of organizing information in an area so a student could delve deeper into it as his further education requires. Developing such a curriculum would be a lot of work. It would involve reviewing the contents of each and every course and reviewing all of our courses as a whole.

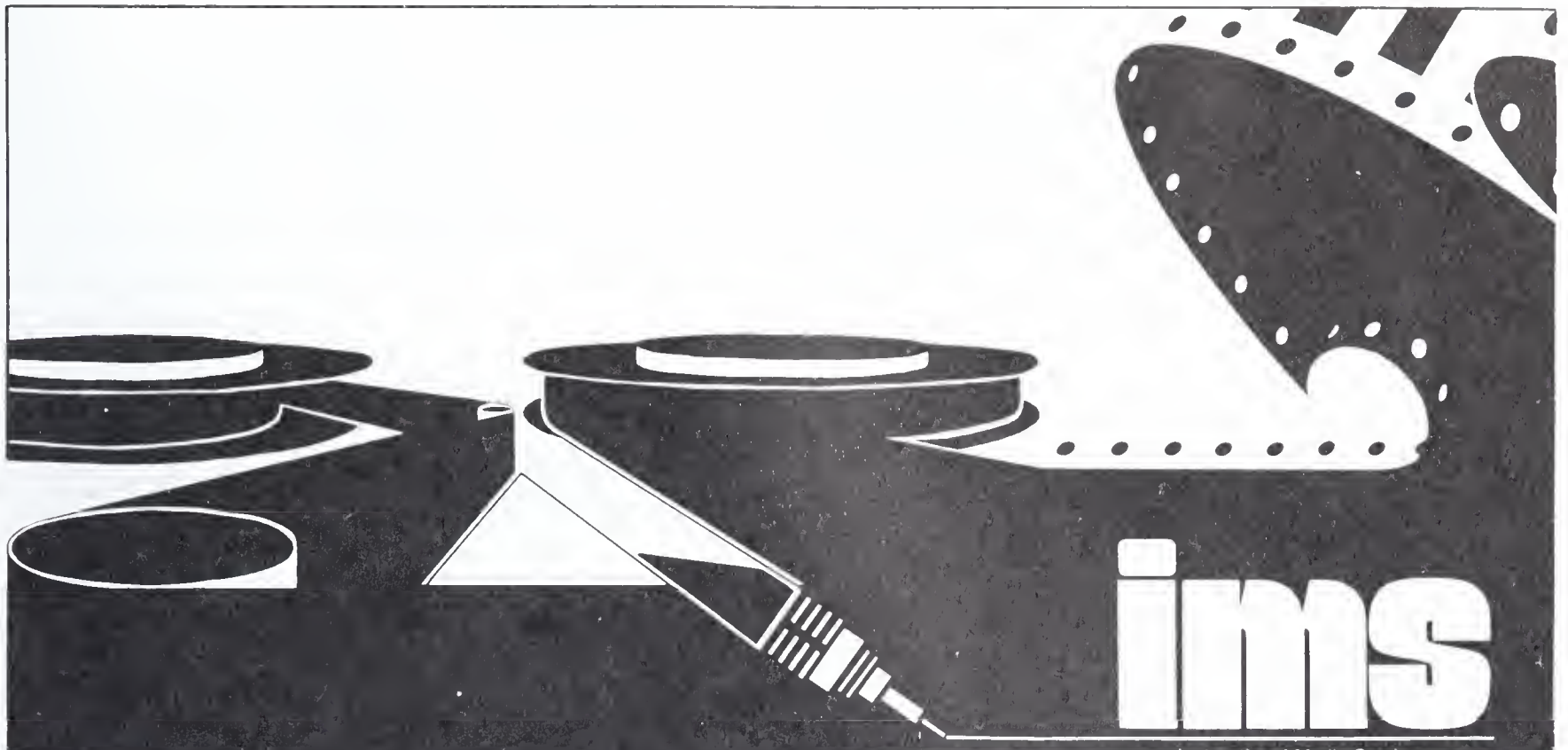
At the moment it seems that too often what is taught stems from a lecturer's particular research interest. Not enough control is exercised over our courses to keep them within manageable hands. Instead, courses and lectures get off onto tangents of their own and simply result in more damn collections of facts to memorize. An effective core curriculum would ensure that only the essential information for organizing the understanding of an area would be taught and the rest could be left up to a student to pursue on his or her own.

Too often in our education it seems it is thought necessary to tell us *everything*. Far better indeed to give us a structure for our understanding and send us off to read other areas in depth. Far better than lecturing to passive scribes who scribble down all that is said and would be to have seminars where students, having done some reading on their own time set aside for that purpose, could pursue clinically-oriented problems. Such discussions would prepare us better for the practice of thinking independently and applying our knowledge than would preparing for trivia examinations.

The development of a core curriculum and the turn to more seminar-based teaching are not panaceas. But they are especially important in the first two years of medical school where subjects like anatomy and histology have developed all out of proportion of their medical usefulness. These changes cannot alone correct the many ills of medicine. But they can, if pursued vigorously and thoroughly, begin to correct the tyranny of facts in medicine. They would make medical education less brain crunching and less mentally maiming and so, I think, contribute to better patient care. They would also give us time to think and in so doing make medicine a more rational and scientific affair.□

Footnotes

1. One of the best modern views of science may be found in J. Agassi, *Science in Flux* (Holland, 1975). In chapters 12 and 14 Agassi distinguishes science from technology. Science, he writes, is interested in truth but technology in success. The two are not always the same.
2. John Stuart Mill, *On Liberty* (New York, 1947), p. 58.
3. J-C. Sournia, *Logique et Morale du Diagnostique* (Paris, 1962), p. 19.
4. cf. K. Popper, *The Logic of Scientific Discovery* (New York, 1968) and P.K. Feyerabend, *Against Method* (London, 1975).
5. For a wonderful book on the excitement of scientific novelty, cf. June Goodfield, *An Imagined World* (New York, 1981).
6. J.S. Mill, *op. cit.*, pp. 34-37.
7. The difficulties of decision-making is explored in W. Kaufmann, *From Decidophobia to Autonomy: Without Guilt and Justice* (New York, 1973).



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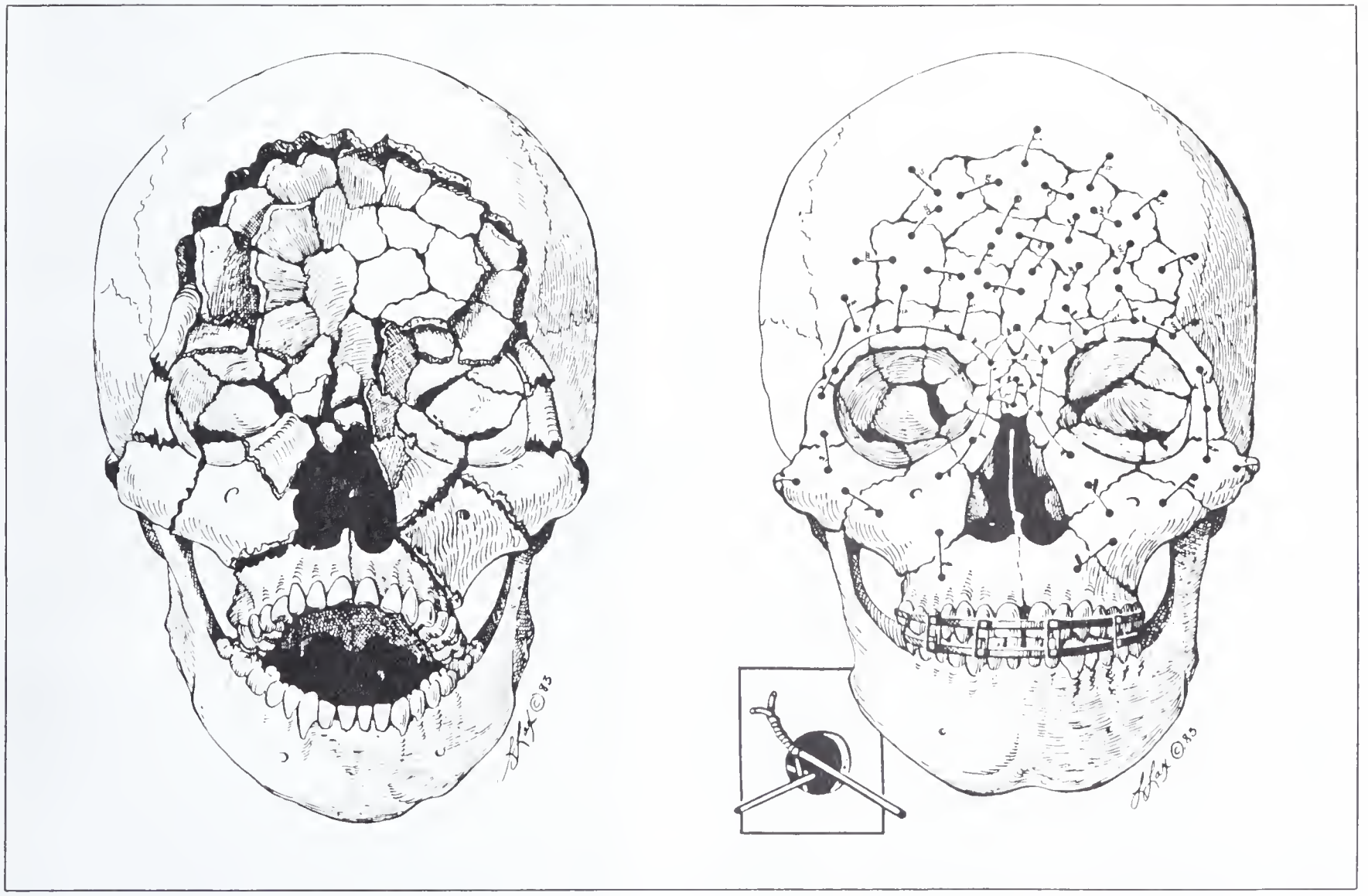

Illustration by Leila Lax, 8T3, Art as Applied to Medicine

MEDICAL EDUCATION

The Medical Humanities?

Linda Harvey 8T5

The University of Toronto Medical School is trying to get a Medical Humanities course (or courses) integrated into its undergraduate M.D. programme. More power to them. The fact that we do not have such a course already is a little shocking, particularly when one considers that few traces of this type of material are scattered throughout the other courses we take. (I speak from a second year perspective, being a second year student myself, but my understanding is that things don't change dramatically in subsequent years).

One criticism which has often been levelled against modern society in general is its lack of human values: the impersonalism of large corporations, city life, the replacement of individuals by machines. This erosion of the personal is certainly not sparing the medical profession. As prospective doctors we all come from this same society and bring with us, to a greater or lesser degree, some of its prejudices and assumptions. All of the doctors now in practice are in the same situation, with the possible exception of a very few old-timers. The proliferating wealth of technological aids to medicine — new diagnostic techniques, machines for scanning this and monitoring that, machines for replacing bodily functions — is certainly having its impact on us as well, as are the large modern hospitals geared around these new devices.

While the majority of these developments are valuable in accomplishing the tasks they were intended for, when considered collectively they have a profound, unrecognized and not necessarily positive influence on our sense of values. What this requires on our part is a critical re-evaluation of our attitudes toward our fellow human beings and the value of human life. Some of the older values just don't fit anymore, nor do some of the unspoken assumptions that accompany the technology.

Where do we start?

Let me share with you some of the changes that have happened in my own thinking in some of these areas during my brief sojourn in medical school, then we can consider some alternatives.

Although I had certainly been exposed to ethical issues before coming to medical school, among them such widely discussed concerns as abortion, "brain death", and whether a person should be told he/she is dying, it was mostly during the ethics elective last year that I started to organize and consolidate my thinking about them. I learned that there were several ways of approaching these questions, for example, "equal fairness to all" vs. "autonomy of the individual", or "adherence to principle" vs. "consideration of consequences of individual acts". I began to realize that: 1) there were far more of these issues than I'd imagined and 2) that I would be facing many of them on a day-to-day basis. I don't think first year is too soon to start dealing with these concerns.

In fact, I think dealing with one's feelings and commitments to ethical issues is essential throughout one's medical career. For instance, medical practice will inevitably bring one into contact with people of different cultural backgrounds, whose own ethical systems are based on different premises and assumptions, and one will need, as a caregiver, to recognize and respect these different values. As well, the situations one finds oneself in are continuously changing, and it can have rather serious repercussions for oneself, one's patients, one's co-workers, institution, etc. if in the face of a sudden ethical dilemma one behaves ill-advisedly or takes a later-regretted stand.

In the stable culture of 100 years ago, ethics could probably be taught pretty well implicitly, by integrating it into methodology, i.e. "this is the right way" to do things. Today, with our rapidly changing capabilities (artificial insemination, embryo transplants, life support systems), this is no longer true, and each physician must be equipped with problem solving techniques, not just habit, to deal with these issues.

What can we do about the situation? Basically there are two broad options: using our own resources, and using resources from elsewhere. Each of us is a functioning human being with ears, eyes, a brain and hopefully a certain amount of sensitivity to our fellow human beings. We can observe, ask questions, discuss and draw conclusions. We can test our conclusions in practice and observe the results.

In addition, we can avail ourselves of the vast accumulation of experience and insight laid down by generations of the human race before us. Material relevant to us as future medical practitioners is not restricted to medicine and related subjects. Law, history, literature and religion have useful contributions to make.

A physician can't bring to a doctor-patient relationship a humanity he does not have. I think a sincere appreciation of the human race as a historical entity and of medicine's place in it would be invaluable, as would an empathy for the struggles, triumphs and failures of individual beings against their individual circumstances. (One thing that strikes me about the majority of my classmates is that they are people who have never had serious problems.) I think literature and history, properly used, could be extremely useful in this area and could perhaps take the place of some of the "life experiences" most medical students have not yet had.

While somewhat scarce in our society, deeply held religious convictions and a sense of faith can be valuable and often unrecognized source of strength to a person in distress. This certainly was the case for several groups in the concentration camps during the second world war, and is no less so on an individual level in the face of a life threatening or chronic debilitating illness. It is up to us as doctors to be perceptive of a person's strengths or weaknesses in this area and to work with them.

In the case of law the relevance is more obvious. All of us will face the possibility of malpractice suits and should know our rights and obligations under the law. The issue of confidentiality will come up for many of us with respect to insurance claims and possibly employment practices and for some of us with respect to threats and/or confessions of violence. All of us should know about the rights of the handicapped, including the mentally handicapped, and what the legal recourses are if one of our patients is the victim of a crime.

The more legally-minded among us might want to involve themselves in legal reforms centered around concerns such as the use of life support systems, artificial insemination, embryo transplants and other aspects of high technology medicine.

In many ways the humanities are inextricably woven into the fabric of medicine. To ignore them totally throughout four years of medical school would be at least as foolish as omitting anatomy or microbiology. We would be incomplete doctors. With careful planning, it might be possible to sandwich most of the issues discussed above into the existing courses and clinical sessions, however I certainly don't see this being done. This leaves us with a rather large gap in our training. Perhaps a Medical Humanities course will help to correct this deficit.□

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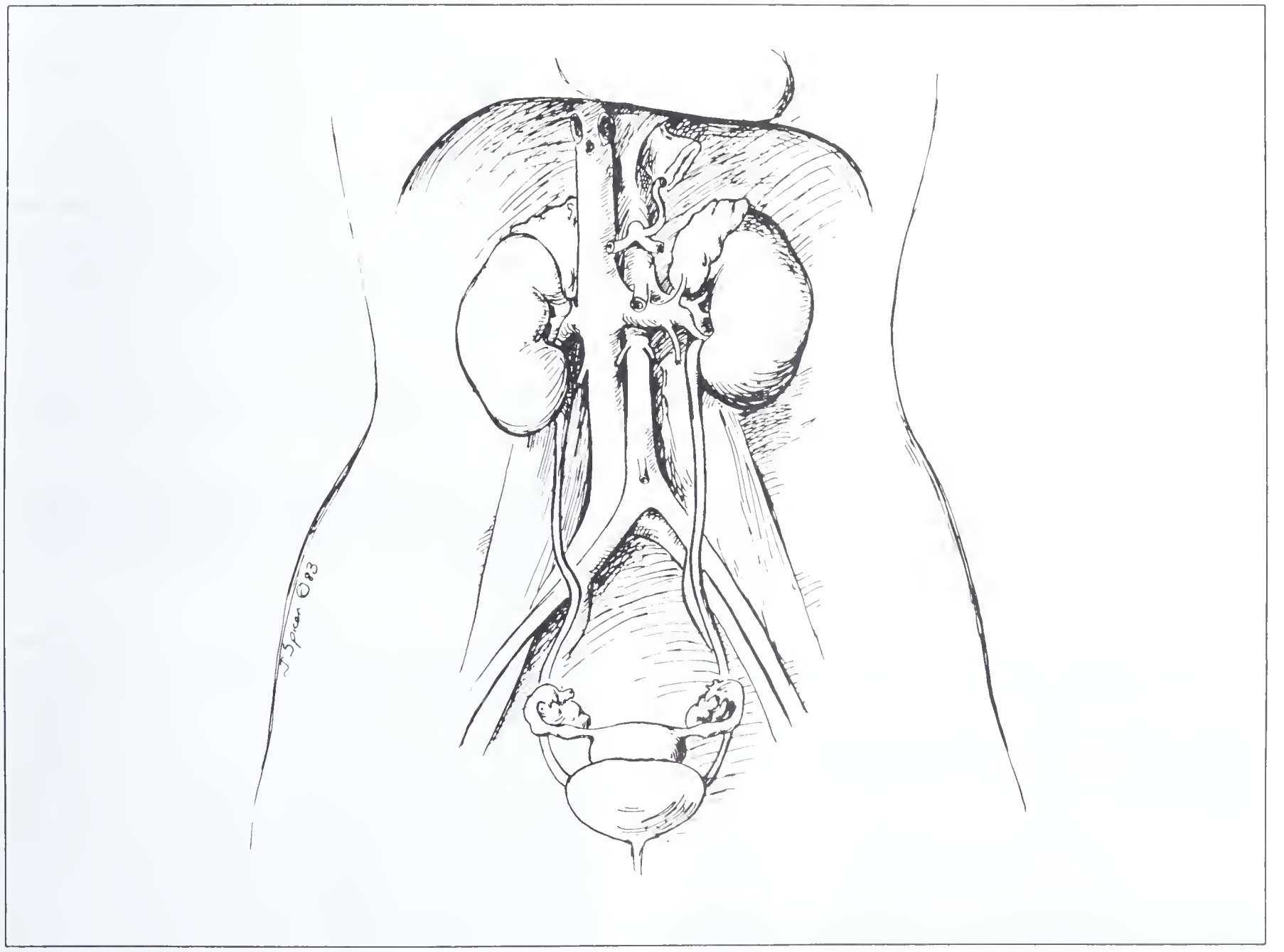

Illustration by Joyce Spicer, 8T3, Art as Applied to Medicine

ORTHOPAEDICS

A Comparative Review of Surface Replacement Arthroplasty and Conventional Total Hip Replacement

Rick Zarnett 8T3

The 2 to 5 year clinical results of 20 surface replacement arthroplasties of the hip (SRA) were compared to 20 conventional total hip replacments (CTH) performed during the same time period. All operations were carried out by the same surgeon for similar indications and reasons. Four SRA hips failed as compared to one CTH. Of the remaining 16 SRA hips, 56% were classified as good or excellent with Harris hip scores of 80 or greater, and 19% were classified as poor with scores of less than 70. In the CTH group, 90% were classified as good or excellent and none as poor. The average increase in Harris hip score, preoperatively to the time of review, was 40.7 in the SRA group as compared to 58.0 in the CTH group. All failures in both groups were due to loosening of the acetabular component of the prothesis, as determined by clinical and radiographic evaluation at follow-up. Four of the 5 hips with inflammatory arthropathy which underwent SRA either failed or were classified as poor. The results appear to indicate that surface replacement arthroplasty may not be an effective alternative to conventional total hip replacment, and should be carried out only in a highly selective patient population.

Although surface replacement arthroplasty of the hips (SRA) has many theoretical advantages over conventional total hip replacement (CTH), a valid comparison of the two must take into account both the clinical and functional results. Preservation of bone stock, low infection rate, and the many alternatives available for revision or salvage made SRA popular in the early and mid 1970's. But, recently, with the increasing number of reports citing high failure rates, many surgeons are reconsidering the indications and patient selection for this procedure.[3 4 9 10]

In order to evaluate SRA properly, one must compare it to CTH. Since a double blind study is not possible, SRA should be compared to CTH done during the same time period for a similar group of patients.[1] Bierbaum retrospectively compared forty patients who underwent SRA with forty patients who had undergone CTH.[12] In most cases, CTH were carried out prior to the use of SRA. In his study, he found the results in the two groups to be comparable.

The literature reports many series in which SRA has a higher rate of revision and failure than CTH.[5 9 10] But just how well do patients with SRA who have not undergone revision, function as compared to the group who have undergone CTH? In this study we examined two groups of patients who had been operated on by the same surgeon, during the same period of time for similar reasons, and compared not only the failure rates but also the patients' clinical level of function.

Materials and Method

Between 1978 and 1980, 81 replacement arthroplasties of the hip were performed by the senior advisor. Twenty-two of these were SRA using the technique described by Freeman et al.[7] with ICLH instruments and components. The remaining 58 were CTH.

Surface Replacements

Overall, 22 surface replacements were done in 18 patients. One patient died (unrelated to his hip surgery), and one patient refused to return for follow-up. Twenty hips in 16 patients were followed for 2 to 5 years and are included in this study. The average age was 45.9 years. There were 9 female patients (4 with bilateral procedures) and 7 male patients. The preoperative diagnoses were osteoarthritis in 6 hips, congenital dysplasia in 4, rheumatoid arthritis in 3, avascular necrosis in 2, post-traumatic osteoarthritis in 2, ankylosing spondylitis in 2, and protrusia acetabuli in 1. (Table 1).

The average follow-up for this group was 41.8 months, (ranging from 26 to 60 months). Only one patient had previous hip surgery: a soft tissue release for congenital dysplasia of the hip.

Conventional Total Hips

The comparison group was selected from the CTH patients. This group was composed of 20 hips in 17 patients operated on during the same time period. All replacements were done using the Charnley-Müller prosthesis. The group selected had no contraindications for the alternative SRA, were available for follow-up, and had no previous hip joint surgery. One patient had a previous femoral osteotomy. Six hips were chosen from those operated on in 1976 (one year before the surgeon was performing surface replacements) to bring the comparison group to a total of 20 hips. The average age was 58.9 years (ranging from 30 to 74). Only 2 patients were older than 70 at the time of surgery. There were 7 male patients (3 with bilateral procedures) and 10 female patients. The pre-

operative diagnoses were osteoarthritis in 13 hips, rheumatoid arthritis in 2 hips, avascular necrosis in 2, post-traumatic osteoarthritis secondary to avascular necrosis in 2, and the sequelae of slipped capital femoral epiphysis in one hip (Table 1). The average follow-up was 49.4 months (ranging from 26 to 67).

Table I. Patient Population

Surface Replacement Arthroplasty

Disease	No. of Hips
Osteoarthritis	6
Congenital Dysplasia	4
Rheumatoid Arthritis	3
Post-traumatic Osteoarthritis	2
Avascular Necrosis	2
Ankylosing Spondylitis	2
Protusia Acetabuli	1

Conventional Total Hip Replacement

Disease	No. of Hips
Osteoarthritis	13
Post-traumatic Osteoarthritis	2
Rheumatoid Arthritis	2
Avascular Necrosis	2
Slipped Femoral Epiphysis	1

The primary indications for replacement arthroplasty in both groups were pain and loss of function with destructive joint changes. All patients were assessed in retrospect and assigned a preoperative Harris hip score.[8] With this scale the hip is assigned points for each of five categories: pain (44), function (33), activities (13), deformity (5), and range of motion (5). An unimpaired hip is given a maximum score of 100 points.

Preoperatively, all patients were placed into one group or the other by the senior advisor. SRA was preferred for the young active patient who might be expected to outlive conventional total hip.

The 2 groups were matched so as to be as close as possible with respect to age, preoperative diagnosis and availability for follow-up. During the study period, each patient was either interviewed and examined in person, or interviewed by phone. Adequate information was obtained to assign a postoperative Harris hip score to all patients. All patients who were able to return to clinic had standard radiographs taken at the time of review.

Results

Surface Replacement Arthroplasty

SRA was performed on 22 hips, 20 of which were available for follow-up. One patient died of myocardial infarction 28 months after surgery. Although he had no problems with his hip and was pain free, he is not included in this study because Harris hip scores and radiographs were not obtained for an adequate follow-up period. Another patient refused to return for follow-up. Her replacement was still functioning but she suffered a sciatic nerve palsy with minimal return of function.

The remaining 20 hips had an average follow-up of 3.7 years. Eight hips were followed for 4 to 5 years, 6 for 3 to 4, and 6 for 2 to 3 years.

Four hips in 3 patients required a revision of their original arthroplasty. One patient with juvenile rheumatoid arthritis had bilateral failures (Case 1). One hips failed at 14 months and the other at 54 months. The other failures were in one patient with congenital dysplasia of the hip and one with osteoarthritis. The average age of those patients which required revision was 33.5 years, (ranging from 14 to 59). The average time to failure was 24.5 months postoperatively (ranging from 12 to 54) (Table 2). The average age of those patients which did not undergo revision was 49.0 years (ranging from 29 to 70). All failures in this series were due to loosening of the acetabular component.

Table 2. Failures

Preoperative Diagnosis	Age at Operation (years)	Arthroplasty Type	Time to Failure (months)
JRA	14	SRA x 2	14, 54[2]
CDH	47	SRA	18
OA	59	SRA	12
2°OA[1]	61	CTH	12

[1] = Osteoarthritis secondary to trauma
[2] = Bilateral failures at 14 and 54 months
JRA = Juvenile rheumatoid arthritis
CDH = Congenital dysplasia of the hip
OA = Osteoarthritis
SRA = Surface replacement arthroplasty
OTH = Conventional total hip replacement

There were no cases of deep venous thrombosis or pulmonary embolism. No dislocation of the prosthesis occured in the series, but one patient had sublaxation of the hip associated with a crack in the cement of the acetabular component. There were no femoral neck fractures and no cases of infection. One patient developed postoperative femoral nerve palsy which subsequently recovered. Two patients developed postoperative sciatic nerve palsy. One refused to return for the study and, therefore, the extent of recovery could not be determined. The other patient had partial return of function. In both of these patients, an attempt had been made to correct a significant leg length discrepancy.

The average preoperative Harris hip score was 36.7 points. The 16 hips which were not revised had an average post-operative score of 80.3 at the time of review. This was an average increase of 40.7 points. No patient lost points as a result of their surgery. The average follow-up for these patients was 41.8 months (Table 3).

Table 3. Follow-up and Harris Hip Scores

	Average Follow-up (months)	Harris Hip Score: Average Preoperative Score	Harris Hip Score: Average Postoperative Score	Harris Hip Score: Increase[1]
SRA	44.0	36.7 (n = 20)	80.3 (n = 16)	40.7
CTH	49.4	33.8 (n = 20)	91.8 (n = 19)	58.0

SRA = Surface replacement
CTH = Conventional total hip replacement
[1] average scores are for post-op non-revised hips.

The clinical results were divided into four categories. Seven hips with scores between 90 and 100 points were classified as excellent; 2 with scores between 80 and 89 points, good; 4 with scores between 70 and 79, fair; and 3 with scores less than 70 as poor (Table 4).

Table 4. Results of Hips Not Revised At 2 to 5 Year Follow-Up

	SRA No.	SRA %	CTH No.	CTH %
Excellent	7	43.8	15	79.0
Good	2	12.5	2	10.5
Fair	4	25.0	2	10.5
Poor	3	18.8	0	0.0
Total	16	100.0	19	100.0

SRA = Surface replacement arthroplasty
CTH = Conventional total hip replacement

Conventional Total Hip Replacement

The group of patients undergoing CTH had an average follow-up of 49.4 months (ranging from 26 to 69 months) (Table 3). Four patients were followed for 2 to 3 years, 5 for 3 years, and 11 for greater than 4 years.

One patient in this group required revision. This was a 61 year old female who underwent CTH for post-traumatic osteoarthritis (Case 2). This failure was due to acetabular loosening and non-union of the osteotomy of the greater trochanter (Table 2).

The complication rate was similar to that for the SRA group. There were no cases of deep venous thrombosis or pulmonary embolism. There were no post-operative dislocations, sublaxations or femoral neck fractures. There were no cases of femoral or sciatic nerve palsy.

Fifteen hips were scored as excellent with Harris hip scores of between 90 and 100; 2 with scores between 80 and 89, good; and 2 with scores between 70 and 79 were classified as fair (Table 4). No hips had postoperative scores of less than 70 at the time of review. The average increase in score, pre-operatively to the time of review was 58.0 points (Table 3).

Case 1: A fourteen year old girl underwent bilateral SRA for juvenile rheumatoid arthritis. The left hip was operated on 3 months before the right. Fourteen months post-operatively the right hip developed pain. At operation the acetabular component was found to be loose and was subsequently replaced. Thirty-six months later, pain again developed in the same hip. There was radiographic evidence of loosening of the acetabulum and at operation it was found that there was failure of fixation between the cup and cement. The acetabulum was reinforced with a Müller type ring and a standard cup was replaced. Fifty-four months after the original operation on the left hip she again developed acute pain. Radiographs and bone scan suggested loosening of the acetabular component and sublaxation of the hip. At operation a crack in the cement of the acetabular component was found and this hip was repaired in a similar fasion as the other.

Case 2: A 61 year old female underwent a CTH for osteoarthritis secondary to a traumatic injury sustained at the age of 7. Twelve months after hip replacement she still had pain in her hip. Radiographs revealed a questionable radiolucency around her acetabulum, and the wire holding the greater trochanter had broken. Her white cell count and erythrocyte sedimentation rate were normal and a bone scan showed increased uptake in the trochanteric region. At revision, the greater trochanter was found not to be united and the acetabular component was loose. The acetabular component was revised and the greater trochanter bone grafted and fixed.

Discussion

Several studies have shown an unacceptably high incidence of failure in patients undergoing SRA. Head,[9] reviewing his experience with the Wagner procedure, found a failure rate of 39%. Freeman,[5] reviewing 115 hips followed for more than 3 years reported a clinical failure rate of 33%, and Capello and Trancik[3] reported a 20% revision rate for 90 surface replacements followed for 2 to 4 years.

Amstutz et al. stated that to be fair, SRA should be compared to CTH performed at the same time in a similar group of patients.[1] In choosing whether an individual would undergo a SRA or a CTH (assuming both of these operations were feasible alternatives) age and level of activity were considered to be the major criteria. The young active patient was considered to be more suited for a surface replacement, thus creating more alternatives should revision or salvage be necessary at a later date.

The failure rate of the SRA group in our study (20%) is not signficantly different from that of others. In Freemans' series of 222 hips replaced between January 1975 and October 1979, he reported a failure rate of 21%[6] and concluded that this failure rate was unacceptably high. In our series, of more interest is the present level of function of the 16 non-revised hips. Only 56% (9 of 16) had a Harris hip score classified as good or excellent compared to 90% (17 of 19) in the CTH group (Table 4).

The SRA group had 3 of 16 patients or 19% classified as poor. The CTH group did not have any patients falling into this category. As well, the average increase in the Harris hip score (preoperatively to the time of review) increased 40.7 points in the SRA group compared to 58.0 points in the CTH group (Table 3).

Even discounting the failure rate of 20% at a 2 to 5 year follow-up, the SRA group was not functioning as well as the CTH group, and on an average did not improve as much at the time of review.

Inflammatory arthritis, which results in osteoporosis and bone resorption, has been implicated as a significant risk for loosening.[12] Jolley et al.[10] suggested that surgeons should be very cautious in selecting patients with inflammatory arthritis for SRA. In our series, 50% of the failures (2 of 4) were in hips with rheumatoid arthritis. As well, 2 of the 3 hips with Harris scores of less than 70 were in patients with inflammatory arthritis. Therefore, 4 of the 5 patients in our series with inflammatory arthritis have either been revised or have had a poor functional result.

Acetabular loosening was responsible for all the failures in our series in both groups reviewed. According to some authors, acetabular loosening, originally blamed on high frictional torques produced by the SRA design, does not produce significantly higher acetabular cement-bone shear stresses than the CTH[4]. The acetabular loosening is probably due to either a stress concentration effect on the underlying cement and bone or due to tissue reaction to wear debris.

Conclusions

Although this is a limited series, the results seem to indicate that SRA may not be an effective alternative to CTH. Recognizing the potential risks of failure in patients with inflammatory arthropathy, one must weigh these risks against the proven advantages when considering these patients for SRA. As various improvements in technique and component design evolve the results of surface replacement arthroplasty may some day be comparable to those of conventional total hip replacements. Until that time, surface replacement should only be performed in a highly selective patient population.□

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References

1. Amstutz, H.C.; Graff-Radford, A. Mai, L.L.; and Thomas, B.J.: Surface Replacement of the Hip with the THARIES System. Two to Five-Year Results. *J. Bone and Joint Surg.*, 63-A: 1069-1077, September 1981.
2. Bierbaum, B.E.; Surface Replacement Arthroplasty vs Total Hip Replacement. *Orthop. Trans.*, 6: 86, 1982.
3. Capello, W.N.; and Trancik, T.M.: Indiana Conservative Hip Results, 2 to 4½ Years. *Orthop. Trans.*, 5:375, 1981.
4. Clarke, I.C.; Biomechanics. *The Orthop. Clin. North Am.*, 5: 681-707, 1982.
5. Freeman, M.A.R.; Bradley, G.W.: Experience with the ICLH Surface Replacement Hip Prosthesis. *Orthop. Trans.*, 5: 375, 1981.
6. Freeman, M.A.R.; Bradley, G.W.: ICLH Double Cup Arthroplasty. *The Orthop. Clin. North Am.* 5: 7-9-811, 1982.
7. Freeman, M.A.R.; Cameron, H.U.; and Brown, G.C.: Cemented Double Cup Arthroplasty of the Hip: A 5 Year Experience with the ECLH Prosthesis. *Clin. Orthop.*, 134: 45-52, 1978.
8. Harris, W.H.: Traumatic Arthritis of the Hip after Dislocation and Acetabular Fracture: Treatment by Mold Arthroplasty. An End-Result Study using a New Method of Result Evaluation. *J. Bone and Joint Surg.*, 51-A: 737-755, June 1969.
9. Head, W.C.: Wagner Surface Replacement Arthroplasty of the Hip. Analysis of Fourteen Failures in Forty-One Hips. *J. Bone and Joint Surg.*, 63-A: 420-427, March 1981.
10. Jolley, M.N.; Salvati, E.A.: and Brown, G.C.: Early Results and Complications of Surface Replacement of the Hip. *J. Bone and Joint Surg.*, 64-A: 366-377, March 1982.
11. Steinberg, M.E.; Summary and Conclusions. *The Orthop. Clin. North Am.* 5: 895-901, 1982.
12. Wagner, Heinz: Cemented Surface Replacement in the Hip Joint. *Orthop. Trans.*, 5: 374, 1981.

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Erin Boynton 8T5

Introduction

Despite numerous publications advocating the use of the uni-compartmental knee replacement, considerable discussion in the orthopaedic community exists as to its efficacy. To date, it would appear that uni-compartmental knee replacement has not been totally rejected nor completely accepted. Controversy concerning indications and contraindications exists, particularly with respect to patient selection.

In order to help clarify the matter, a retrospective review has been performed by the author and compared with previous reports in an attempt to define factors which predispose to either success or failure when uni-compartmental knee replacement is used as a possible alternative in patient management with uni-compartmental medial or lateral knee joint destruction.

Material and Methods

In the period 1972 to 1981, 36 patients underwent uni-compartmental knee replacement. Eleven of these had bilateral knee operations for a total of 47 knees. Nine patients were not included in the review either due to death in 5 cases or follow-up of less than 2 years in 4.

The original Marmor prosthesis was used in 6 cases, followed by 26 uni-compartmental Gunsten replacements and more recently, a Savastano replacement was performed on 15 knees.

The underlying diseaes at operation consisted of primary osteoarthritis in 3 individuals, post-traumatic osteoarthritis in 5, rheumatoid arthritis in 2, hemophilia in 1, osteonecrosis in 3, failed tibial osteotomy in 3, old infection in 1, and a previous MacIntosh arthroplasty in 2 cases.

There were 23 females and 14 males in this series with age ranging from 24 to 84 years and a mean age of 67 years.

In this series 37 knee replacements involved the medial compartment and 10 knees had lateral compartment replacements. All patients had grade 4 changes in the articular surface of the knee. The average post-operative evaluation was conducted at 3.2 years within a range of 2 to 9 years. The right knee was replaced in 23 cases and the left knee in 24 cases.

Sixteen individuals were markedly obese at the time of surgery and it was subsequently felt that this prejudiced the results. Two knees had a previous patellectomy, and 3 patients underwent a complete or partial patellectomy at the time of joint replacement.

The patients were assessed both pre and post-operatively at 2 years, 5 years, and after 5 years using a modified version of the Freeman[3] rating system. A maximum total of 120 points was available. Excellent results were graded as over 110 points, good results from 90 to 109 points, fair results from 70 to 80 points, and poor results below 70 points. Using this system, pain, walking ability, and range of motion were considered. The modified system was somewhat more severe than Freeman's original scoring in that the use of a cane was included and the number of points allocated for range of motion were more difficult to attain (see Table 1).

Table I. Modified Freeman Knee Rating System

Pain	**Points**
none	50
Mild	40
Moderate	15
Severe	0
Ability to Walk	
Outdoors, unlimited (30 min), unaided	20
Outdoors, several blocks, unaided	15
Outdoors, several blocks, aided	10
Indoors only	5
Unable	0
Range (Arc) of Motion	
110°+	30
90°-109°	25
75°-89°	20
50°-74°	10
30°-49°	5
0°-29°	0

Overall Assessment

If the patient scores 40 points on Pain, 30 points on Range (Arc) of Motion, and 10 points on Ability to Walk, then an additional 10 points are added to the total score.

Post-operative Assessment

$$\text{Post-op Assessment} = \% \text{ Pre-op Assessment} = \frac{\text{Post-op arc}}{\text{Pre-op arc}} \times 100\%$$

100% pre-op arc +10 points
100% pre-op arc + 0 points
100% pre-op arc −10 points

Results

Using the modified Freeman rating system, the overall results were excellent in 20.5% of cases, good in 38.4%, fair in 7.7%, and poor in 33%. The rating system was felt to be harsh and, as a result, many of the knees which received low scores were, in fact, subjectively rated higher by the patients (see Table 2).

Table 2. Overall Post-operative Results

	Excellent (110+ points)	Good (90-109 points)	Fair (70-80 points)	Poor (70 points)
2 years	19%	42%	11%	29%
5 years	24%	53%	18%	6%
5 years	11%	33%	11%	45%
overall	20.5%	38.4%	7.7%	33%

Results are expressed as percentage of post-op patients.

Range of Motion — The average pre-operative score obtained for an individual's range of motion was 25, with a range of 0 to 30. The average post-operative score was 30 points, and the range from 10 to 40. Pre-operatively, the arc of motion was measured, whereas post-operatively the range of motion was assessed as a percentage of pre-operative function (Table 1).

Eighty-six percent of patients were found to remain within the same category or improve their range of motion. An increased range of motion of 20 degrees or more was obtained in 44.7% of patients. Thirteen percent of patients showed a decrease in range of motion of between 10 and 15 degrees.

Individuals who required a revision or were classified as poor did not necessarily show a decrease in the range of motion. An increase in the range of motion was noted in some cases. Since an increase in the arc of motion has an affect on the ability to walk, and to obtain comfort whilst in a sitting position, an improvement in range of motion exhibited with the use of uni-compartmental knee replacement was felt to be significant.

Walking Ability — Pre-operatively, the average score obtained in the ability to walk was 9.6 with a range of 0 to 15. Post operative scores averaged 12.9 with a range of 0 to 20. Of 6 patients who were completely wheelchair bound prior to surgery, 5 were subsequently capable of walking outdoors for several blocks with the aid of a cane. The sixth person was not successful because of psychological factors. Thus a significant improvement in the ability to walk was seen in a number of severely handicapped individuals following surgery. Surgery improved 40% of the patient's functional mobility in that they could manage equal or greater distances without any walking aids.

Pain — All patients experienced moderate to severe pain pre-operatively. At 2 years, 42% of patients had no pain, 29% had mild discomfort and 29 still experienced a moderate degree of pain. Fifty per cent of those experiencing mild pain experienced their discomfort in the retropatellar region of the knee and this was felt not to be secondary to their compartmental replacement. Of the 11 people or 29% who were still experiencing a significant amount of pain following surgery, 5 were revised to bi-compartmental prostheses, and 3 underwent successful uni-compartmental revision.

An explanation could not be found for the pain felt by two patients (three knees) despite investigations using repeated x-rays, bone scan, and in one case, re-exploration. No factors for continued pain could be found, other than obesity. It was felt that psychological factors in these two patients played a major role.

Overall the uni-compartmental knee replacement provided significant relief of pain in 71% of patients.

Factors Affecting Results — Numerous factors were assessed and related to the possible success or failure of the procedure. These included sex, age, deformity, side, previous surgery, previous patellectomy, inter-operative patellectomy, previous trauma, and whether the patient suffered from unilateral or bilateral disease.

There were no differences as to whether the medial or lateral compartment was replaced, contrary to previous reports. Whether the patient suffered from a varus or valgus deformity did not affect the overall result.

Age, sex, and weight of the patient all affected the result of surgery. The younger, less than 65 year old male, and overweight patient had a poor result and a much higher rate of revision. It was felt that younger male patients may have been more active and thus placed a greater stress on the knee leading to subsequent failure. Greater body weight of the obese male patient may lead to increased loading of the joint. Cameron et al. did not feel that age and sex influenced the failure rate, whereas Jones, Brian, and Paterson et al. conveyed that these parameters did play a role which affected success. It was felt that age, sex, and weight would predispose the patient to failure and should be considered as possible contraindications to uni-compartmental knee replacement because of increased strain and stress placed on the prosthesis and possibly the contralateral compartment leading to loosening and accelerated cartilage degeneration.

Females over the age of 65 faired well with an average pre-operative score of 49 (35-60) and a score at 2 years of 86, 5 years 98, and over 5 years of 80 (65-105). There was little difference between unilateral and bilateral replacements. The further scores were 94 points at 2 years, 101 at 5 years, and 85 at over 5 years post-operatively, whereas those patients who underwent bilateral replacement scored 79 points at 2 years, 96 at 5 years, and 77 at over 5 years.

The compartment replaced, either medial or lateral, or the presence of a flexion contracture greater than 15 degrees did not affect the outcome of surgery. Contrary to these results, several authors have felt that these factors might influence the outcome of surgery. Cameron et al. contend that uni-compartmental replacements should only be performed in the medial compartment whereas Laskin and Insall report the opposite. Laskin and Insall also felt that flexion contractures greater than 10 to 15 degrees are contraindications to uni-compartmental replacement.[4 9] The results given here indicate that the success of replacement is not affected by the presence of a flexion deformity or the compartment which is diseased. No other factors could be found to explain these contraindications.

Pre-operative varus or valgus alignment of the knee did not bias results. From the data available for analysis, the exact degree of genu valgum or genu varum could not be measured as pre-operative 3′ standing x-rays were not generally available. An analysis of records allowed one to determine the presence of deformity however.

Several authors [1 4 9] have indicated that varus or valgus angulation greater than 15 degrees or a deformity that is not passively correctable is a contraindication to uni-compartmental replacement.

The presence of a post-operative deformity has also been reported as a contraindication. Laskin stated that there was no correlation between either the final element or the amount of correction in degrees in the overall result, and Jones, Brian, and Peterson have all reported that a varus alignment after uni-compartmental replacement was associated with a higher incidence of failure.

It was felt that a more detailed analysis was required in order to determine whether the degree of angulation influences the failure rate of uni-compartmental knee replacement. The data from this report would indicate that there appears to be no correlation between pre-operative malalignment and post-operative failure.

Disease etiology did not appear to affect failure and success. Cameron et. al. reported fewer successes with patients having inflammatory arthropathy. Unfortunately, the number of cases undergoing uni-compartmental knee replacement as a result of inflammatory disease in his series was too small to provide valid conclusions. The patients who had rheumatoid arthritis did well following uni-compartmental knee replacement in this series.

Uni-compartmental replacement done for post-traumatic arthritis generally showed evidence of poor results in this series. Two of five patients who suffered from post-traumatic arthritis were classified as poor. One case was due to degeneration of the contralateral compartment and the other case was due to loosening of the tibial component. These failures were, however, felt to be attributable to other patient characteristics which have been discussed, in particular, age and sex.

Laskin advocates the use of uni-compartmental knee replacement only in the treatment of post-traumatic arthritis. Jones, Brian, and Peterson et. al. have indicated that post-traumatic arthritis is a contraindication to uni-compartmental knee replacement due to an exceptionally high failure rate of 59% in their series. The results of this series would seem to support that conclusion. However, post-traumatic osteoarthritis is probably not a contraindication if the patient is not obese and over the age of 65.

Previous surgery appeared to affect results as well. Five patients had undergone previous bony surgical procedures of the proximal tibia and/or tibial plateau. These included four high tibial osteotomies and one open reduction and internal fixation for a severely comminuted post-menopausal osteoporotic tibial plateau fracture.

Of these five patients, four subsequently required complete joint replacement in three cases and a revision of the prosthesis in one patient. A fifth patient had a poor result but it was largely felt to be due to psychological factors. Several authors [1 8] have reported similar findings. The results of this study show a 100% correlation between bony surgery and the failure of uni-compartmental knee replacement.

Previous complete patellectomy also appeared to lead to a poor result. Of two patients with previous patellectomies, both recorded poor scores. Partial or complete patellectomy at the time of surgery, however, did not seem to predispose to failure. Patellectomies were performed along with uni-compartmental replacement in three knees, all of whom achieved good results. Laskin and Insall found that patellectomy prior to, or at the time of uni-compartmental replacement did not improve the final result. Englebrecht et. al. and Marmor, however, reported that patellectomy at the time of surgery may alleviate patelofemoral symptoms, a conclusion reached by this author as well.

Uni-lateral Disease — The scores of patients with uni-lateral disease were higher than those having bilateral knee disease, and the former group required fewer revisions (Table 2). Of those requiring surgery on one knee (19 cases), the average pre-operative score was 47 with a range of 20 to 60. The post-operative score at 2 years was 90 in 19 cases, and at 5 years, 104 points in 7 cases. There were, however, 4 revisions.

Bilateral Disease — The average pre-operative score in 10 patients undergoing surgery on 20 knees, was 52 with a range of 40 to 60. The post-operative score at 2 years averaged 69 on 20 knees with a range of 50 to 120. At five years, the average score was 93 but this was on 10 knees only.

Revision Surgery — Of the 47 knees, 10 required revision. Four had previously had unilateral surgery and 3 were significantly improved. Six knees in bilateral patients required revision and all improved, although 2 subsequently required further revision after a further 5 years.

These figures would help to substantiate the conclusion that uni-compartmental knee replacement is more suitable in a patient with disease in one knee only.

As noted above, the overall results were excellent in 20.5% of knees, good in 38.4%. fair in 7.7%, and poor in 33%. At 2 years however, 29% of the patients recorded a poor result. At this time it was elected to perform total knee replacements in 4 cases. As well, 3 revisions of uni-compartmental prostheses were conducted, all of whom were successful. Three of these patients required revision and were graded as poor due to pain, despite an objective grade of good to excellent. All causes for pain were examined and found to be negative, and it was felt that psychological factors played a major role as noted earlier.

At 5 years, one further knee required revision to a bi-compartmental prosthesis and 3 knees required revision of the uni-compartmental prosthesis, all of whom achieved good to excellent results.

In those patients over 5 years, 4 patients who had previously had a successful revision, required further modification to total knee arthroplasty.

At the time of revision, two major reasons for failure were observed to be degeneration of the contralateral compartment and secondly, loosening and/or sinking of the tibial compartment. This latter factor was noted only in the patients having undergone the Gunsten replacement.

Overall, 5% of subjects exhibited degeneration of contralateral compartments. Eleven percent displayed loosening of a tibial component and 5% failed because of a combination of the two. Eight percent of failures did not have evidence of either.

The frequency of degeneration of the contralateral compartment is similar to that reported by Lasken (11%), Englebrecht (6%), Marmor (9%), and Cameron et. al. (9.6%). There is agreement with these authors who attribute degeneration of the adjacent cartilage as secondary to cement and polyethy-

lene particles which became embedded in the articular cartilage. Jones, Brian, Peterson et. al. and Scott and Welsh, report a much lower frequency (1.4%) of failure due to accelerated cartilage degeneration. These changes reflected several patient characteristics the majority of which affected the amount of stress placed on the patient, such as weight, deformity, age and sex.

Prostheses — Six patients received Marmor prostheses, and these were the first cases in the series. Two were bilateral. One remained good 9 years following replacement. One patient died with a good result early in the series. One patient underwent bilateral replacement and required revision to a Gunsten prosthesis, one at 1 year and one at 3 years. Another patient underwent a single knee replacement with a Marmor prosthesis which required revision after 2 years to a Gunsten prosthesis and subsequently died. It was felt that the major cause for failure in the early form of the Marmor modular prosthesis was due to cold flow of the high density polyethylene. The prosthesis generally used was the thin, 6 mm tibial component. It was subsequently recognized by Marmor and others [8] [12] that this to cold flow and subsequent failure.

Failure in the 26 uni-compartmental Gunsten replacements was generally due to sinking and/or loosening of the wedge-shaped tibial component. Successful revision was occasionally obtained by inserting a higher tibial component, but these generally led to failure requiring total knee replacements after a number of years.

The Stavostinal prosthesis has been used more recently in 15 knees and none have required revision to date. The tibial component used has generally been thicker and cold flow has not been a problem. It is now recognized that the ideal tibial component is probably a metal backed polethylene component.

Summary

The overall failure rate in this series was 33%. Other authors have reported failure rates of a slightly lesser degree. Insall and Walker reported a 26% failure rate. Englebrecht et. al. 22%, Laskin 20%, and Marmor 15%.

Failures are generally attributed to age, sex, obesity, and bilateral disease and choice of prostheses. From this series uni-compartmental knee replacement provided signficant relief of pain in 71% of cases. Laskin reported relief in 65%, and Jones et. al. in 88%. Other authors have noted marked reduction of pain as well.[2] [11] It appeared that the presence of flexion contractures in disease etiology, with the exception of post-traumatic arthritis and deformity, did not affect the overall result. Obviously the success rate can be improved by proper patient selection.

In conclusion, it would appear that uni-compartmental knee replacement is an excellent alternative to high tibial osteotomy in the treatment of the elderly (over 65), non obese, uni-laterally diseased female. It was felt to be preferable to tibial osteotomy since the post-operative convalescence and rehabilitation is generally shortened and the morbidity relationship in our experience is much less. It is of interest however that of 47 knees analyzed, no patients exhibited evidence of thrombophlebitis and there were no infections. It was felt that uni-compartmental knee replacement, where indicated, is preferable to total knee replacement and subsequent revision. It is certainly less morbid and technically easier than revision following total knee replacement.□

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Bibliography

1. Cameron, H.V., G.A., Welsh, R.P., and Bailey, W.H.: Unicompartmental Knee Replacement. *Clin. Orthop.*, 160: 109-113, 1981.
2. Englebrecht, A., Siegel, A., Rottger, J., and Buccholz, H.W.: Statistics of total knee replacement; partial and total knee replacement, design St. Georg. *Clin. Orthop.* 120: 54-64.
3. Freeman, M.A.R., Todd, R.C., and Cundy, A.D.: The presentation of the results of knee surgery. *Clin. Orthop.* 128: 222, 1977.
4. Insall, J. and Walker, P.: Unicondylar knee replacement. *Clin. Orthop.*, 120: B3-B5, 1976.
5. Insall, J., and Aglietti, P.: A five to seven-year follow-up of unicondylar arthroplasty. *J. Bone and J. Surg.*, 62-A: 1329-1337, 1980.
6. Jones, W.T., Bryan, R.S., Peterson, L.F.A., and Ilstrup, D.M.: Unicompartmental Knee Arthroplasty using Polycentric and Geometric Hemicomponents. *J. Bone and Joint Surg.*, 63-A: 946-953, 1981.
7. Laskin, R.S.: Modular Total Knee-Replacement. *The Orthop. Clin. of N.A.* Jan: 223-249, 1976.
8. Laskin, R.S.: Modular Total Knee-Replacement Arthroplasty. A review of Eighty-nine Patients. *J. Bone and Joint Surg.*, 58-A: 766-773, 1976.
9. Laskin, R.S.: Unicompartmental tibio-femoral resurfacing arthroplasty. *J. Bone and Joint Surg.*, 60-A: 182-185, 1978.
10. Mallory, T.M. and Dolibois, J.M.: Unicompartmental total knee replacement *Clin. Orthop.* 175: 199-201, 1976.
11. Mamor, L.: Results of Single Compartment Arthroplasty with Acrylic Cement Fixation. A Minimum Follow-up of Two Years. *Clin. Orthop.*, 122: 181-188, 1977.
12. Marmor, L. The Modular Knee, *Clin. Orthop.* 94: 242, 1973.
13. Marmor, L.: The Modular (Marmor) Knee. Case Report with a Minimum Follow-Up of 2 years. *Clin. Orthop.* 120: 86-94, 1976.
14. Skolnick, M.D., Bryan, R.S., and Peterson, L.F.A.: Unicompartmental Polycentric Knee Arthroplasty. Description and Preliminary Results. *Clin. Orthop.*, 112: 208-214, 1975.

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ORTHOPAEDICS

Wound Healing, Wound Contraction and the Myofibroblast

Eric Grafstein 8T5

A wound to the skin can heal by a number of different processes depending chiefly on the extent of tissue loss from the wound. In wounds with significant tissue loss, contraction of the wound aids in the healing process. It is believed that the cell responsible for wound contraction is the myofibroblast. The origin and function of this cell is reviewed in this article.

When considering the various organs in the body, one tends to think of heart, lung, liver, kidney, and brain and often forgets to consider the integument as a functioning organ. The primary roles of the skin are: 1) sensation; 2) thermoregulation and 3) protection against mechanical, chemical, and thermal insults while serving as a physical barrier against the invasion of microorganisms. The skin handles insults ranging from x-rays to the ultraviolet rays of the sun and from the cut of a scalpel blade to the ravages of a large body surface area (BSA) burn.

In order to maintain or reestablish its integrity, the integument must be capable of rapid and effective restoration of continuity. Wound healing in injured skin may occur by one or more of three possible processes. These are: 1) regeneration, 2) repair and/or 3) contraction. The extent of the wound injury governs the response elicited by the integument. A superficial second degree burn, a burn which does not penetrate entirely through the dermis, will heal solely by regeneration of the epidermis from the remaining epidermal adnexa. A surgical incision heals by a combination of regeneration and repair. Regeneration produces little or no scarring while the repair process involves a slightly larger but definite scarring reaction. Contraction occurs when there is significant loss of tissue. The contraction process produces intense and maximal scarring.

The Healing Process

The wound healing process starts with an inflammatory response to tissue injury. Injury to endothelial cells and tissue initiates the activation of the complement and coagulation systems, including the aggregation of platelets. Aggregated platelets in concert with thrombin and collagen release a host of platelet-derived factors. These plus other plasma proteins form a "soup" known collectively as the chemical mediators of inflammation. These chemical mediators are responsible for the chemotaxis of neutrophils and other leukocytes which occur within the first 24 hours following injury, the increased proliferation of fibroblasts, neovascular growth, and the activation of macrophages.[7] The chemical mediators of inflam mation lead to the production of factors which serve to alter the basic structural components of the skin, allowing them to assume the task of repair. Most notable of these substances is a hypothesized epidermal growth factor responsible for the replication and migration of the surface epidermal cells to cover the wound, and FGF (fibroblast growth factor), a factor believed to be derived from the activated macrophage.

In healing of a wound by first intention (i.e. a clean surgical incision) the chronology of events is as follows: Within the first two hours, a clot containing chiefly fibrin, forms over the wound. It is the fibrin which acts as a "glue" by maintaining the wound margins in close proximity to one another. By twelve hours, the cells of the stratum basale become hypertrophic and mitotic figures begin to appear. Migration of the replicating germinal cells down the sides of the wound margin then begins, and by the third day post-injury, the migrating epithelial cells meet at the base of the wound. This thin layer of epithelial cells now begin to thicken as the other layers of the epidermis form. The epidermal reaction is essentially completed by day five. While this is occurring, there is a concommitant reparative phase in the subcutaneous tissue. By day three post-trauma, the neutrophils of the early inflammatory response are replaced by activated macrophages. By day five the basic cellular components of granulation tissue are present, namely hypertrophic, replicating fibroblasts and new, budding blood vessels as well as macrophages. The fibroblasts are responsible for the deposition of collagen, proteoglycans, and the extracellular matrix. These are the non-structural components of connective tissue. During the second week post-trauma, the primarily spongy and edematous vascularity of granulation tissue is gradually replaced by the structural non-cellular components, chiefly collagen. A remodelling process ensues in which the thin and haphazardly arranged collagen fibrils of one month post-injury become denser and more aligned. By approximately four months the collagen remodelling becomes stabilized leaving a scar, the visible remnant of the healing process. The scar represents the replacement of lost tissue.

As mentioned previously, a significant difference in the pattern of wound healing occurs if there is significant tissue loss. In a wound that heals by second intention, the basal layer of the epidermis cannot migrate sufficiently quickly to form a thin continuous covering of epithelium in 48 to 72 hours. In a larger wound, which is typically seen in extensive deep second and third degree burns, a more intense inflammatory response and wound contraction occurs. Wound contraction is defined as: "the inward movement of the edges of an open wound, secondary to the forces generated within that wound."[12]

Contractile Element — The Myofibroblast

The elements involved in contraction were unknown until the early 1970's when it was discovered that among the granulation fibroblasts observed in wound helaing there were

other previously unidentified cells which took on a progressively more smooth muscle-like character. These cells having electron microscopic characteristics of both fibroblasts and smooth muscle cells became known as "myofibroblasts."[3] (Fig. 1) It was noted that these myofibroblasts possess an increased proportion of rough endoplasmic reticulum thought to be active in collagen synthesis. A convoluted nucleus and numerous microfilament bundles which appear to be actomyosin-like in nature are also present.[3] The myofibroblast possesses increased gap junctions and hemidesmosome connections which are important in linking cells together and allowing cell-to-cell communication of information concerning contraction.[4] "Microtendons" of protein extending from the cell to the surrounding stroma appear to act as anchoring structures for the myofibroblast.[1] It has also been documented that epithelial cells which are replicating and migrating to cover the wound site also develop contractile proteins as well as an increased number of gap junctions between these regenerating epidermal cells.[4]

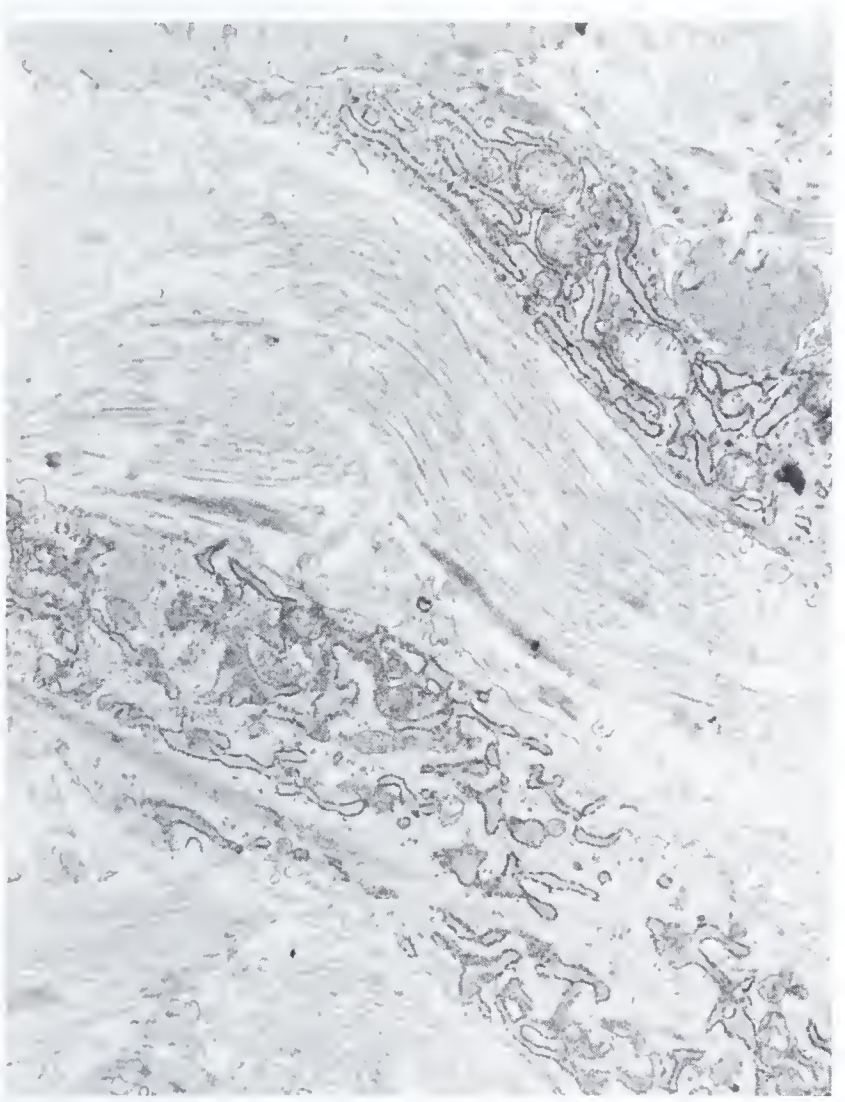

Fig. 1 Myofibroblast observed in a hypertrophic scar. The contractile bundle is observed within the cytoplasm of the cell shown in the centre of the field. Highly dilated endoplasmic reticulum is seen in both cells (x 18,000) (From *Symposium on Basic Science in Plastic Surgery* Vol. 15 Krizek T., Hoopes J. ed.; C.V. Mosby Co., St. Louis 1976, pp. 104).

Pharmacologic evidence concerning the role of the myofibroblast is also quite convincing. In a water bath, agents that normally stimulate smooth muscle to contract also stimulate strips of granulation tissue from open wounds in humans and animals.[3] It would appear from ultrastructural and pharmalogical evidence that the myofibroblast is ideally suited for contraction. Although myofibroblasts appear to share characteristics of both smooth muscle cells and fibroblasts, it is not known with certainty that the fibroblast is indeed the precursor of the contracile cell.

Further evidence demonstrating the central role of the myofibroblast comes from studies of the rates of wound contraction. The correlation between rates of contraction and the proportion of myofibroblasts in a wound is striking. Wound contraction generally begins on the seventh to tenth day post injury. This coincides with the appearance of a significant population of myofibroblasts, the main cell type in granulation tissue. Contraction generally occurs for up to ten to twelve weeks and this coincides with a marked decrease in the formation of myofibroblasts. Myofibroblasts are also found to be evenly distributed throughout granulation tissue.[5]

Although it is apparent that the myofibroblast is involved in the contraction process, it is difficult to understand how these scattered muscle-like cells are able to bridge the often large distances and produce a fixed scar. The proposed mechanism for contraction which has received the greatest support is the "lock-step" mechanism.[10] It is theorized that as a group of myofibroblasts all linked by gap junctions and hemidesmosomes contract, tangled 12nm filaments are being produced by the cell. These microfilaments keep the myofibroblasts contracted until collagen fibres can reorganize and "cement" the tissues into a more permanent position. The contraction process can be furthered by the continued proliferation of more myofibroblasts followed by additional collagen deposition and remodelling until the wound is maximally contracted. Thus, the wound edges would, in effect, be "pulled" towards each other.

There are two questions which are clinically important in the discussion of the role of the myofibroblast in wound healing. First, it is important to know what are the stimuli for the initiation of contraction and second, what factors cause the disappearance of myofibroblasts at the end of contraction. There is much speculation, with relatively little substantiation at this time, concerning the nature of the stimuli for myofibroblast formation and disappearance. One hypothesis by Baur[1] states that myofibroblasts may develop due to the abnormal Po_2 and/or Pco_2 levels found in the overly vascularized granulation tissue. In normal wound healing there appears to be a relationship between the replication of fibroblasts potentiated by growth factors at a low Po_2 and the stimulation of enzymes for collagen synthesis at a high Po_2. The influx of new vessels into the initially hypoxic wound site during the formation of granulation tissue constantly alters the microenvironment of a wound.[1] When the wound becomes sufficiently healed, the microenvironment returns to normal and the scarring process ceases. Presumably, in wounds that heal by second intention, a specific alteration in the microenvironment stimulates the contraction of the myofibroblast. Furthermore, it is known that a wound which is covered by either a full-thickness or split-thickness skin graft before the myofibroblasts have initiated contraction (one week), exhibits significantly inhibited wound contraction.[9] The graft does not prevent the formation of myofibroblasts, merely their ability to contract.[10] It is thought that the graft interacts with the wound bed in such a way that the life cycle of the myofibroblast is altered.

Recent work into the tension generated in a wound, indicates that mechanical tension formation may increase myo-

fibroblast formation and contraction.[11] In this hypothesis a wound would continue to contract until an equilibrium is established between the inward pull of the rachet-like contractions of the myofibroblasts and the outward force generated by the elasticity of the surrounding normal epidermis. The equilibrium that is reached is often a radical contortion of the original wound.

Contracture

While wound contraction is an essential and often advantageous process, allowing a wound to close quickly and the integument to perform its protective function more effectively, there are medical situations in which the contraction can be excessively harmful to the patient by producing "contracture". Wound contracture, a fixed and rigid scar deformity, can often occur in extensive BSA burns producing detrimental results not only cosmetically, but also by leading to a decreased range of motion and serious debilitation. Common thermal injury sites are the face, the back of the hand, and axilla. Contracture often occurs on the flexor surfaces of joints. In light of the discovery of the role of the myofibroblast in contraction, there are a combination of techniques used to prevent excess contraction from proceeding to a state of contracture. Range of motion exercises attempt to remodel the developing collagen to form a scar so that it will not inhibit movement of the patient. A second technique is splinting which involves an attempt to counteract the myofibroblast pull be exerting a force in the opposite direction. This is often employed in patients with burns to the forearm and can aid in alleviating or significantly reducing contracture. Lastly, a medium split-thickness skin graft can, as previously mentioned, dramatically decrease the amount of contracture in a healing wound, as long as it is applied before one week postburn. Biochemical agents, such as colchicine and vinblastine, which might be used to prevent wound contracture by virtue of their ability to inhibit myofibroblast contraction are generally considered too toxic to be of any significant clinical use.[1]

Extremely extensive second and third degree burns present a complication in the treatment of contracture. Specifically, a very large BSA burn may mean that there are not enough donor sites to harvest enough skin to cover all the deeply burned areas. Furthermore, it usually takes about two weeks for donor sites to completely reepithelialize and to become ready for reharvesting. Recent researchers have attempted to use porcine xenografts and synthetic biomaterials such as Biobrane[2] and gelatin-based materials[6] over the wound site in order to inhibit the contraction process sufficiently until an autograft can be applied. The artificial biomaterials may serve to either alter the microenvironment in which the myofibroblasts develop or exert sufficient outward tensions to oppose the inward contractile forces generated by the myofibroblasts (Fig. 2).

Problematic contracture is not necessarily a by-product of integumentary injuries but can occur in the palmar fascia of the hand producing a Dupuytren's contracture. Significant contraction can also form in the scar tissue capsule which forms around a breast implant. Even conditions such as cirrhosis of the liver can produce severe contracture scars of the organ, thereby restricting potential hepatocyte regeneration. By unravelling the mysteries of the myofibroblast and its role in wound healing, it may be possible to control contracture and to regulate this potentially harmful effect.□

Fig. 2 Demonstration of the inhibition of wound contraction in the pig model using a gelatin-based material (GBM). Each of the six equal size excisions equivalent in depth to third degree burns were given the following different treatments: 1) covered with GBM and skin grafted at 14 days. 2) covered at a standard dressing and skin grafted at 14 days. 3) covered with standard dressing and skin grafted 7 days. 4) covered with GBM and skin grafted at 7 days. 5) skin grafted on day 0. 6) covered with standard dressing and no skin graft. (Photograph courtesy of Dr. W.J. Peters, TGH).

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References

1. Baur, P.S., Larson, D.L., Stacey, T.R.: The observation of myofibroblasts in hypertrophic scars. *Surg. Gynecol. Obstet.* 141:22, 1975.
2. Hall-Woodroof, Inc., 3100-7 Harvard St., Santa Ana, California, USA, 92704.
3. Gabbiani, G., Hirschel, B.J., Ryan, G.B., Statkov, P.R., Majno, G.: Granulation tissue as a contractile organ: a study of structure and function. *J. Exp. Med.* 135: 719, 1972.
4. Gabbiani, G., Chaponnier, C., Hutner, I.: Cytoplasmic filaments and gap junctions in epithelial cells and myofibroblasts during wound healing. *J. Cell Biol.*76: 651, 1978.
5. McGrath, M., Hundahl, S.: The spatial and temporal quantification of myofibroblasts. *J. Plast. Reconstr. Surg.* 69:975, 1982.
6. Patent pending.
7. Robbins, S.L. Cotran, R.S.: *Pathologic Basis of Disease* W.B. Saunders Co. Toronto, 1979 p. 90-95.
8. Rudolph, R. Gulser, S., Suzuki, M., Woodward, M.: The lifecycle of the myofibroblast. *Surg. Gynecol. Obstet.* 145: 389, 1977.
9. Rudolph, R., Guber, S., Woodward, M.: Inhibition of myofibroblasts by skin grafts. *Plast. Reconstr. Surg.* 63: 473, 1979.
10. Rudolph, R.: Contraction and the control of contraction. *World J. Surg.* 4: 279, 1980.
11. Squier, C.A.: The effect of stretching on formation of myofibroblasts in mouse skin. *Cell Tis. Res.* 220: 325, 1981.
12. Van Winkle, W., Jr.: Wound contraction. *Surg. Gynecol. Obstet.* 125: 131, 1967.

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WRITING CONTEST: FIRST PRIZE PROSE

My American Dream

Paul Walden 8T4

I'm an okay kind of guy. I don't bullshit and I don't like to have it slung at me. An okay guy. You get the picture?

So listen to this. I'm sitting around the house one night a couple of months ago watching the Leafs on the TV, and they're dropping another one. Goddamn teams in this city, they always lose. The Argos, the Blue Jays, the Leafs, this city is just one big shitpile of losers, ya know what I mean? Look, we all bitch a little, but don't get me wrong, I'm not a complainer. I got a good life. A nice place in Don Mills, two color TV sets, I got one in the bedroom, a nice wife, two kids, one's studying to get into law school and the girl's taking Arts over at York. I got a good job, foreman, union straight down the line. The way I look at it, they've always been good to me, eh? I do okay.

So I'm sitting one night, watching the TV just kind of relaxing. I had a hard day. The wife's out with her bowling league and I'm sitting around hoisting a few brew with a bag of cheezies for a chaser. And what with one thing or another, I had a hard day and all that, I start to get a bit dozy. So I lay back and close my eyes for, I don't know, maybe twenty minutes or so, and all of a sudden, there's this big noise, like one of those semis backfiring. I open my eyes, and goddamn it if I'm not on the floor. So I stand up and I notice that something's strange, real strange.

I look around me and the living room's gone and I'm in this shopping plaza, but it's really weird. For one thing, it's all made out of this real flimsy wood. I notice these kind of things, ya know, I've been building for twenty four years. You shoulda seen this place. It's all kinda outdoors, eh? It wouldn't last two days during the winter.

So I start looking around, and boy, this is really weird. There's all these palm trees around, just like in the National Geographic, and it's warm. And I look over to the side, and see that the plaza is on this big hill, eh, and down at the bottom of the hill is this long beach, all this sand and stuff. So I'm looking out over the ocean and shit if it isn't the biggest goddamn thing you've ever seen. Must've been four, five times the size of Lake Ontario.

After awhile, I turn around and I see that I'm standing outside this supermarket, so I figure what the hell, I could use a bite. I get inside, and you should see the checkout girls. They're all blond and they look like Playboy centerfolds. No shit. So I go up to one of them and ask where the chips are and she says over there, in the health food department. Health food department? I think to myself, what kind of wimp supermarket is this, anyway? I walk over to check it out, and I can't find the goddamn chips anywhere, just these funny little banana slices, eh? And all of a sudden, this girl starts talking to me.

Beautiful? Let me tell you, she made those checkout girls look like TTC token sellers. I mean she had a pair of jugs on her that coulda come from a Becker's. And she starts asking me am I from out of town? and I realize that everybody else in the place is dressed in bathing suits and t-shirts and I'm still wearing my work clothes.

So we shoot the breeze for a while and she asks me do I want to go over to her place for awhile. She says she has some kind of hot tub, whatever that is. Are you kidding, I say, Does the Pope shit in the woods, Are bears Catholic? My mother didn't raise any stupid kids, eh?

So there I am, riding along in this sports car job, you shoulda seen it, real sharp, and I ask her, Where are we? She tells me the name of the place, I forget, starts with a D. Del something. But that doesn't help me at all, until I look at the car in front of us. California! Shit, I say, are we in California? and she laughs, what do you think, Cleveland? You shoulda seen this place. Fruit trees, and all these plants I've never seen before and it's nice and warm so I figure what the hell, might as well get some sun, eh? so I take my shirt off and shove it into my back pocket.

Well, pretty soon we get there and there's all these fruit trees, right in the goddamn front yard. Oranges, lemons, Jesus, I never saw anything like it. She takes me inside and we sit down on the floor on these pillows and she asks do I want something to drink, and I say sure, I was getting kinda thirsty, how about a Golden? A Golden, she says, what's that, some new kind of herbal tea? I'll go see if we have any in the kitchen. And she comes back in a few minutes with this cup. She says she's alll out of Golden so she brought some stuff called Ginsing. Tasted kinda weird, but ya know what they say, when in Rome and all that kind of shit.

So we sit there for awhile, just shooting the shit, when she says I look a little run down, would I like her to do a little Reflexology on me, so I figure What the Hell? I never heard of this reflexology stuff but she tells me to take off my shoes and socks and make myself comfortable.

She starts sticking her fingers into my foot, and to tell you the truth it didn't feel bad at all, when all of a sudden she pushes on this sore spot. Did that hurt? she says, and she gets out this book full of drawing of feet and looks through it.

You know what's wrong with you, she says, you have a weak liver. I bet you could use a nice soak in the hot tub. So she tells me to go on out in back and get into the tub, it turned out to be this big wooden thing filled with hot water, and have a soak. She said she'd be out in a minute, she just had to go into the bathroom and take her clothes off.

So I go out back and she yells at me from the bedroom to

help myself from the bottle of wine beside the tub and to pour some special perfumed oil that was sitting on the table into the water. Well, that sounds good to me, eh?, so I sit down on a chair beside the tub to wait for her and I take a big slug of the wine.

All of a sudden I get dizzy, like I'm going to pass out, then I hear the big noise, just like before, and I open my eyes and shit! I'm back in front of the TV.

Sorry about that, says the wife, I dropped my bowling ball. Did I wake you up? She walks over. How did your chest get all red like that? And what are you doing with your shirt stuck in your pocket like that for? Are you feeling okay?

Well, I just kind of sit there, not saying anything, and she says, you know what you need? a nice, hot bath. Maybe you're right, I say. Of course I am, she says, and put in some of those epsom salts by the tub. You go get ready for a nice soak and I'll bring you a couple of beer.

So she goes off into the kitchen and I'm sitting there still trying to figure out what happened. Shit. I reach forward to turn off the TV and I see that the game is over and that the announcer is saying that once again the Leafs bit the biscuit. Goddamn Leafs, always losing, eh?

Always losing.□

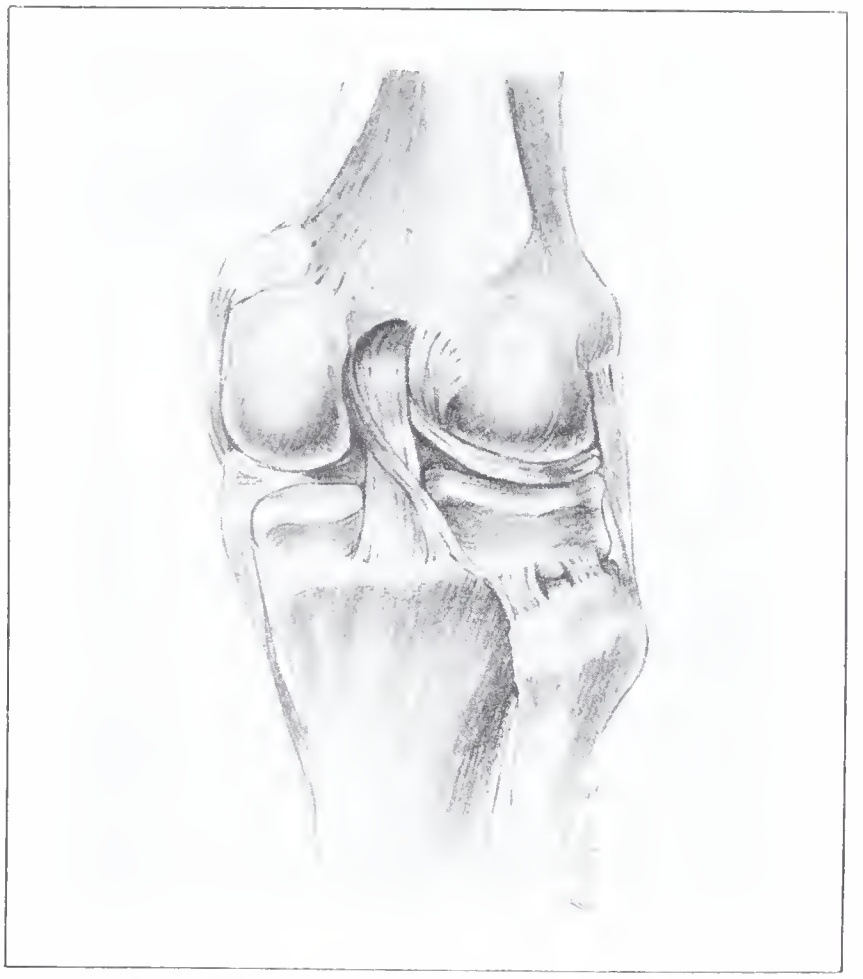

Illustration by Mary Trafford, 8T3, Art as Applied to Medicine

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WRITING CONTEST: SECOND PRIZE PROSE

Mad Dogs and Lunatics; Or, How Not to Shop for Christmas

J.L. Pitt 8T5

I hate Christmas shopping. Ask me to tame tarantulas, ask me to leap tall buildings in a single bound, even ask me to figure out your income tax returns; but don't think for one minute that I am so foolhardy as to brave a crowd of Christmas shoppers. Give me hungry lions instead.

Some things can't be avoided, and last year's broken leg was one of them. Instead of skipping around through empty stores on Boxing Day catching the bargains and doing next year's shopping, I was lying in traction. Not many people manage to break a leg while fishing under the tree for presents, but I have always had special talents in that line. This year I plan to have a lightweight artificial non-tippable tree.

At any rate, I was stuck. So out came my Cossack coat, skinny wallet, galoshes, safety helmet, nightstick, tear-gas bomb and plan of action (left over from WW2 manoeuvres). On the way there I briefly considered getting lost and avoiding the whole thing, but I couldn't have missed the place; traffic was backed up in the shopping centre's Free-Flo lanes as far as the highway. I spent fifteen minutes getting a suntan on top of the car, and then, as the Free-Flo lanes were still constipated, I parked in the nearest ditch and walked the rest of the way.

The throng swept me through the doors, and I almost lost heart. I tried to travel upstream and back out the door but independent movement of any kind was impossible. The din was worse than a barrel of angry cats. If you've ever visited Bedlam you'll know what I mean. Muttering the motto of my World War II regiment like a prayer, I clutched my nightstick firmly, rammed my helmet down over my eyes and plunged into the mob. The first counter that came into focus was some feet away, and though I made grimly for it, I came into contact with at least a dozen elbows and feet, and once stepped on a small screaming child. He bit me.

Breathless, I surfaced, grabbed the counter and dared to lift my helmet above my eyes. It was a perfume counter, with exotic bottles stacked on display and even more exotic prices. I think booze cost less during prohibition than these crystal vials full of shark liver oil or essence of poison ivy. Alas! I had gasped there too long and a formidable matron was bearing down on me. Her dark, dark lipstick and pancake-pale face reminded me of nothing so much as a hungry vampire. That woman doused me in five of the most fearful smells my olfactory senses had ever been assaulted with, and was aiming a sixth when, out of desperation, I grabbed a bottle and slapped it on the counter.

"Here, never mind, I'll take this," I gasped. She looked at me strangely and boomed in her best foghorn voice, "You want to buy an empty bottle?" I looked at the wretched thing and sure enough, it was an empty bottle. I could feel my face going red so I pretended to be a bottle collector apoplectic with indignation. "Madam, this is no 'empty bottle'! This is a rare issue, a real collector's piece. I'm willing to pay fifty dollars for it."

I don't know why I named such an outrageous price. The look she gave me classed me somewhere in the lunatic fringe, and I was beginning to agree. As I tried to slink away through the jostling crowd, the foghorn voice started booming again, gleefully rehashing my idiotic behaviour. A greater crowd milled closer, and I reflected bitterly that she should charge a dollar a head and make her a fortune. I also wondered how to make an empty tester bottle look like a fifty dollar Christmas present.

My next stop was a bathroom fixtures specialty store. I did not plan to buy anything there; in fact, I had no Christmas list at all. I believe in spotting presents and buying them spontaneously; that way you can check all the bargain tables first, rather than setting your heart on a Seiko Quartz watch for Uncle Sebastian and finding its price has recently gone up 300%.

So I stepped into the bathroom store and was immediately submerged in a faerie world of see-through shower curtains, towels with bathtubs to match, and mod commodes. The whole store was a series of bathrooms done in different shades and styles. I mean, I just can't see taking a bath with Pierre giving me the finger from his vinyl pattern on the wall.

I started to slip out unobtrusively, but I don't have that kind of luck. A skinny, pimpled clerk popped up from nowhere, grabbed my arm and proceeded to give me a guided, or rather, guarded tour; he was as anxious to see me go as a python is to release its dinner. After fifteen minutes of fast, hard sales talk he sold me a polka-dot toilet. Red-purple-orange polka dots even. Our bathroom is done in shades of yellow. I contemplated throwing myself over the railing into one of the fountains on the main mezzanine, but with my luck I would have missed and landed on a sidewalk mattress sale instead.

Grimly I hung on. One more purchase to go, just one more. My safety helmet was getting battered and my nightstick was bitten in half by a small child. Everywhere shoppers were jostling, elbowing and cursing — a real holiday spirit in the air. Eventually the crowd deposited me in front of a jewelry store where, gasping, I took stock. One empty bottle, one polka-dot toilet. A nice bauble might soothe the jangled nerves sure to result from these presents. I took no chances, though. My tear-bomb was held ready in front of me as I crept in the side door. Furtively I sidled toward the far counter: twenty feet ... ten feet ... five feet ...

"May I help you?" — too late. This time a very worldly clerk with two layers of false eyelashes. False eyelashes always remind me irresistibly of little spiky spider legs, and these waved about like tipsy black widows. I told the eyelashes I wanted to buy a fairly expensive piece of jewelry.

"What price range were you thinking of?" From the gleam beneath the eyelashes I could tell she was on commission and hoping I was Ari Onassis in disguise.

"Oh, you know. Very expensive," I said expansively. She smiled and brought out three gold bracelets, each $1000. I fingered the single remaining $50 bill in my pocket and shook my head. She brought out three chunky necklaces; these were cheap, only $700 apiece. My bill was crushed in my sweaty palm. Four rings were next, ranging from $900-$1200. My bill was a solid, sticky ball. I started to sweat.

"Er, ahem," I said weakly. It came out as a squeak so I tried again. "Ahem! Er — have you anything a little less expensive?" Disappointed, she brought out three pendants, each $300. I wiped the sweat out of my eyes in order to see them.

"Uh," This was terrible, she'd think I was a eunuch. "Uh, my price range is a little lower."

"How much lower?" The eyelashes flapped with displeasure. I wished one would come off. Perhaps I should use the tear-bomb and escape now. There wasn't much left of my $50 bill anyway. I forced my tongue off the roof of my mouth and muttered, "Fifty dollars." The eyelashes snapped up past the eyebrows. "For fifty dollars," she said carefully, "you can buy a sterling silver dinner bell." She looked at me as if she had just smelled something bad.

"Done!" I shouted. Shaking her head, she placed before me a tiny bell. It had no clapper. "It doesn't ring," I ventured, and immediately regretted it. The eyelashes closed in mute supplication, probably to Astarte. Now I wished they'd stay glued together. She quickly wrapped the bell and held out her hand. I withdrew my hand from my pocket and gave her the sticky crumpled ball.

There was silence. "Is this your idea of a joke?" You could have scraped the frost off those words. Angrily she thrust the thing back across the counter. It was a slip upon which I had written "Phone: .....", for a friend due to arrive in town that evening. She did not accept my miserable apologies. Mute with embarrassment, I gave her the $50 and scuttled out of there as soon as her back was turned.

I peeked back around the door — and there was my gift-wrapped bell on the counter. I broke out in cold shivers. To do or die? If I went back in — I didn't have the courage. But if I went home with nothing to show for $50 — death by harangue is not to be relished. I swallowed my cowardice, crept in, snatched it and ran. Down the escalators I fled, through the amazed throng and down the highway to the car. The Free-Flo lanes were still blocked, so I dumped the gifts in the car and walked home. It took two hours, and Christmas Eve the doctor diagnosed pneumonia.

This Boxing Day I shall not be shopping for Christmas. Not next year, either. I have decided to send my family on a trip (sans myself — believe me, they are glad to go!) as their Christmas present; and meanwhile I shall happily tame tarantulas, leap over tall buildings and figure out income tax returns.□

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WRITING CONTEST: POETRY

FIRST PRIZE

For Mr. Layton

Will you let me love you, Irving?
though no one gassed
my grandfather
and I have not been bludgeoned
by my past
nor prodded.

Will you allow me love
if I am terrorized
by my future?
Between a lukewarm pool of pH 5
and the intercourse of neutrons
I hopscotch.

I stand in line for your contempt
Shit on the Gentile
who saw pictures of Auschwitz
and thought of Hiroshima
and Dresden.

Your pitchforks blaze less brightly
than the dying sun.
Your human fluid fills the dance
that always ends flaccid.
The children of your anger
surrender.

Bob Maunder 8T4

SECOND PRIZE

Springtime on back campus/Renewal

Funny
but I never wrote poems
about you
oh
the odd jangled
string of prose
here and there
carelessly
but

never poems

Each time we meet
I suppose
we should run laughing
through a field of flowers
but instead
you smile
I nod
the heavens remain

silent

Funny
but I used to think I
loved you
(you know —
that sudden little
rush on infatuation
intoxication
that you had thought dried
and buried

between yearbook pages)

Quarter moon
— a coda —
I lost you in the fog
hardly noticing the

sudden frost
the long winter

Here you are once more
here we are again
no flowers
only a muddy patch of campus
beneath us
between us

You smile
I nod
and shed my winter wings

at last

Lindsay Davidson 8T6

THIRD PRIZE

For #16583KL: II

I hear the raven cry out
In the midnight air
I think it cries for you
For you've returned to the earth
Where darkness is eternal.

I hear a mother cry out
For her child
Cries as sharp as daggers
She cries for you
For you've been torn
From her womb.

I hear the wind softly whisper
Your name
Bustling through the trees
Gently turning over the wild grass
Seeking you amongst the cattails
By the pond.
It whispers for you
But you'll never play there again.

I hear the sea sighing
With each rhythmic caress
Of the sand's edge
It longs to smooth the hair
From your brow again
But you've disappeared in its depths.

I hear a voice calling
For you
Over and over and over
My voice.
Like a useless record player,
Hollow echoes in an empty mind.

This is a song
Of sorrow
This is a song
Of farewell
This is a song
For you, my twin.

Anne K. Wong 8T6

THE FINAL WORD

The Healer

Harley Hahn 8T4

I went to the Healer.

We sat on the beach. The outline of a shimmering crimson sun shrank slowly against the horizon of still, grey water. He talked, and his words melted and merged, danced before my eyes and between my ears. I felt something I had never felt before, and yet, something that was recognizable.

He would sit, still as the unbroken water. He would think and dream and as he thought, so would it be. He would be with me and we would resonate. We would soar like birds, climbing, banking, diving, then skimming the waves. We would swim like fish, graceful; flick, and we were gone. We would walk through fields, climb mountains, thread our way through narrow canyons. We would stop and watch a spider weave a web. And then eavesdrop on a flower, closing its petals for the night.

The minutes turned to hours, the hours to days, the days blurred into a continuum that broke apart into countless tiny moments, sparkling and dancing. Each passed through me, and I learned to stop and feel.

The Healer was with me.

"It is time for you to go. You wish to learn to heal. I have showed you all I can for the moment. You must leave and study the ways of your fellows. You will return to me when it is time."

"You must find out who you are," he said.

"What do you mean, who I am? And how will I find you again? When will I return?"

He smiled. "Ah, but you have already returned." And he vanished.

And so I travelled to the University. To learn and to study. To teach and to be taught. And to find out who I was.

I went to the chemistry teacher.

"I know who you are. I have taught many like you. You all want to be doctors, don't you? Why you do is beyond me. Long hours, hard work. You are all so competitive. You would give anything for a grade. You would trade away your youth to please your parents. You can't possibly know what you are doing. I know how you feel, I could have gone to medical school. It was the best decision I ever made. I have my home and my garden. Sometime you must come and see my roses. When you are not studying, that is."

I went to the career counsellor.

"I know who you are. You're a candidate for medical school And a good one. You've completed the prerequisites, taken the tests, filled out the forms. This is you. It's all down in black and white on these papers. There's even a picture here. What more could you want? Here you are — this folder has it all. Good luck."

I went to the dean.

"I know who you are. You are special. We take very few applicants to this school. We turn down many people, a lot of them highly qualified. You can be proud. I'm glad we had this chance to talk. Fill out these forms, get a chest X-ray and a TB test, buy your books and be back here at nine o'clock tomorrow morning. Don't worry, the worst is over. Any time you want to talk, that's what I'm here for. We care about each and every one of you. See the secretary on your way out. She'll give you your number."

I went to the anatomy instructor.

"I know who you are. You are one of my students, aren't you? Yes, here's your name on my list and your picture. You are here to learn anatomy. It's very important for you to have a firm grasp of basic medical science. You must memorize this book. All of it, except for page 355, will show up on the exam. Stick to your dissecting and your studying. Don't listen to rumors from your classmates. Keep to yourself and to your work. And if you have any problems — work harder."

I went to my classmate.

"I know who you are. You're like me. You are scared and you are bored and you are tired of studying. You know, sometimes I look at this stuff and it seems so fascinating, but there's so much to learn and so little time, so it's back to the memorizing. We should be glad we're here, shouldn't we? I mean, so many people would give anything to be where we are. Listen, it's Friday night, let's not study tonight. Let's go to a movie. Okay, we'll study for a few hours and then go to a late movie. It's not so bad. At least we're not in law school."

I went to the clinical instructor.

"I know who you are. You know a lot of theory but you don't know anything practical. Listen to this patient's heart. Can you hear the murmur? Of course you can't. How do you grade heart murmurs? Go home and look it up. Practice your physical examination skills whenever you get a chance. Think when you take your histories — be direct in your questioning. Relax. Tell me the branches of the internal illiac artery. Show me five ways to palpate a spleen. Whatever you do, don't examine a patient form the left side of the bed during a clinical oral exam."

I went to the nurse.

"I know who you are. You're a clinical clerk. You are overworked and underpaid, but you're still a student aren't you? I'm lucky, I work a shift at a time. You seem to live at the hospital. You're the one I wake up in the middle of the night to

draw blood. I wouldn't have your job for anything. Cheer up, the staff doctors yell at everyone, don't let it get you down. There's six admissions waiting for you on the ward. I'll see you in the morning."

I went to the intern.

"I know who you are. After all, I'm an M.D. Well, technically anyway. Just between you and me, sometimes I feel pretty ignorant. We're really only apprentices, you know. It's kind of scary when you realize that in a few months I could be in general practise. But I'm gaining confidence all the time. I taught some of the second year students today 'cause the resident was busy. Boy, were they ever dumb. But I guess we all were."

I went to the resident.

"I know who you are. At least I used to. Somehow I've lost my perspective and I'm not sure of anything anymore. It seems like I've been a doctor forever but I'm still living in the hospital. But I can take care of patients. I know what I am doing. I wish they'd give me a chance to operate more often, but the staff doctors keep all the good stuff for themselves. I'd like to get married, but when do I have the time to meet anyone? My board exams are in a few months. I have to go study. No Wednesday is no good, I've got journal club that night. Thrusday is out too, I have to prepare for grand rounds for Friday morning. Maybe next week. Listen, that's my beeper, I'm on call this weekend. Gotta go."

I went to the staff doctor.

"I know who you are. One day, if you're lucky, you'll be like me. Here's my office. Nice view, huh? Sure I work hard, but I enjoy it. I get respect. I make important decisions. I invest my money. I look on you as one of my own children. I'll tell you a joke if I'm in a good mood. I tell good jokes — everybody always laughs. I know that I'm not always as nice as I could be, but I have a lot of responsibility. I may seen arbitrary, but I've paid my dues. Remind me one day, I'll show you a picture of my cottage. Now, tell me the branches of the internal iliac artery."

And I went back to the Healer.

"It has been a long time," I said.

Not so long as you think," he replied. He looked me over. "The years have changed you, but then again, perhaps not. Have you learned much?"

I thought. I stared at the waves, rising and falling to some rhythm that I used to know. I felt the sun on my face and the soft, yielding sand under my body. I could feel my heart sing. I listened to my breath.

And once again, the seconds and minutes disappeared. I tumbled among the spray of moments, up one, down another. I laughed and smiled and felt.

"Have you the answer to my question?", asked the Healer.

I could only sigh.

"The answer was here all along, you know."

"It is? Where? Why didn't you tell me?"

"You wouldn't have understood. You wouldn't have believed me. You must learn patience. Everything in its own good time. Who are you? Go there —?

And he pointed to a small indentation in the face of the cliff.

"— and look for what you seek."

I walked over to the cliff and sat down where he had pointed.

"Up to now, you have been crawling. Now, you begin to walk. Truly, it has not been so long. Be glad, for today you take your first step."

I felt my heart pound in my chest. My hands were wet with sweat.

"Look down in front of you. What you seek has been here all the time."

I thought to turn around to look at the Healer, but I knew he was gone. I had come a long way to be on my own.

I listened to the life around me. The waves, the wind, my breath.

Slowly I leaned forward and gazed into a shallow water-filled depression in the sand. And as I looked, I began to understand. It had been here all along.

For as I looked down, I saw the sunlit pool of water, and from its surface, my own reflection looked back.

I was ready to begin.□

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ORTHO-NOVUM* 1/50

NORETHINDRONE
AND MESTRANDL
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Indication: Conception control.

Contraindications: Thrombophlebitis, thromboembolic disorders, cerebral vascular disease, coronary thrombosis, or a history of these conditions; significant liver dysfunction or disease; history of cholestatic jaundice; known or suspected malignancy of the breast or genital tract, or history of these conditions; known or suspected estrogen-dependent neoplasia; undiagnosed abnormal vaginal bleeding; known or suspected pregnancy; during the period a mother is breast-feeding an infant; any ocular lesion associated with ophthalmic vascular disease such as partial or complete loss of vision, defect in visual fields or diplopia, classical migraine.

Warnings: Discontinue medication at the earliest manifestations of. A. Thromboembolic disorders. B. Visual disturbances including; (i) gradual or sudden, partial or complete loss of vision; (ii) proptosis or diplopia; (iii) onset or aggravation of migraine; (iv) papilledema; (v) opthalmic vascular lesions C. Development of headache which is recurrent; persistent or severe and undiagnosed. D. Psychiatric disturbances. Rule out pregnancy in patients who have missed a menstrual period. Patients with epilepsy, diabetes mellitus, asthma and cardiac or renal dysfunction require careful observation. In women with predisposing factors for cardiovascular disease, oral contraceptives have been reported as an additional risk. After the age of 40 years, for purposes of fertility control, oral contraceptives should be considered only in exceptional circumstances, and when the risk/benefit ratio has been carefully weighed by both the physician and the patient.

Precautions: Before use, take a thorough history, and perform a thorough physical examination including a blood pressure determination and examination of breasts, liver and pelvic organs. A Pap Smear should be taken. First follow-up examination is at 6 months, and at least yearly thereafter, including all tests initially performed Women with a history of jaundice should be prescribed oral contraceptives under close observation. If there is a history of cholestatic jaundice, especially during pregnancy, other methods of contraception should be prescribed. The development of severe generalized pruritus or icterus requires that the medication be withdrawn until the problem is resolved. If jaundice is cholestatic in type, do not resume oral contraceptive administration. Changes in composition of bile and the appearance of cholesterol gallstones have been reported in women taking oral contraceptives. Hepatic neoplasms and nodular hyperplasias or hamartomas have been reported in oral contraceptive users. Although these tumors are uncommon, they have caused fatal intra-abdominal hemorrhage and should be considered in women presenting with acute abdominal pain, an abdominal mass or evidence of intra-abdominal bleeding. Patients with essential hypertension may be prescribed oral contraceptives under close supervision. If a significant blood pressure elevation in previously normotensive or hypertensive subjects occurs at any time, cessation of medication is indicated. Diabetic patients or those with a family history of diabetes should be observed closely Latent diabetics who can be kept under close supervision may be prescribed oral contraceptives. Young patients with overt diabetes whose disease is of recent origin, well-controlled and not associated with hypertension or other signs of vascular disease should be closely observed. In metabolic or endocrine diseases and when calcium and phosphorus metabolism is abnormal, careful clinical evaluation should precede medication. The risk of complications due to adrenocortical insufficiency appears to be minimal with oral contraceptive therapy Estrogen-progestogen combinations may cause an increase in plasma lipoproteins and should be administered with caution to women known to have preexistent hyperlipoproteinemia. Use special judgement in prescribing oral contraceptives to women with fibrocystic breast disease. Persistent irregular vaginal bleeding requires investigation to exclude the possibility of pregnancy or neoplasm. Observe patients with fibroids carefully. Sudden enlargement, pain or tenderness of uterine fibroids require discontinuation of medication. Assess adolescent patients for adequate skeletal development prior to medication, since oral contraceptives may accelerate epiphyseal closure. Oral contraceptive therapy may mask the onset of the climacteric. In general, women in the later reproductive years gradually assume an increasing risk of circulatory and metabolic complications, especially at age 35 to 40. Shorter duration of oral contraceptive use, and avoidance of cigarette smoking is advisable. Patients with a history of emotional disturbances, especially the depressive type, are more prone to have a recurrence. In cases of serious recurrence, the medication should be discontinued in favour of a non-hormonal method of contraception for a trial period to determine if the symptom is therapy related. The following laboratory tests should not be considered reliable unless oral contraceptive therapy has been discontinued for 2 to 4 months: liver function tests; coagulation tests; thyroid function tests; adrenocortical function tests; reproductive endocrine profile changes; and other tests involving phospholipids, triglycerides, serum folate, tryptophan metabolism, and serum glucose. Advise pathologists of oral contraceptive therapy when specimens are submitted for examination. After discontinuing oral contraceptives, the patient should use an alternate non-hormonal method of conception control and await the resumption of normal ovulatory cycles before attempting to become pregnant. Women with a history of oligomenorrhea or secondary amenorrhea or women with irregular cycles may remain anovulatory or become amenorrheic following estrogen-progestogen combination therapy Amenorrhea, especially if associated with breast secretion that continues for 6 months or more after withdrawal, warrants a careful assessment of hypothalamic-pituitary function. Fetal abnormalities have occured in the offspring of women who have taken progestogens and/or estrogens during pregnancy The safety of oral contraceptives in pregnancy has not been demonstrated. Rule out pregnancy before initiating or continuing the contraceptive regimen. Always consider pregnancy if withdrawal bleeding does not occur. Retrospective studies have reported an increased risk of post-surgery thromboembolic complication in oral contraceptive users. Therapy should be discontinued at least 1 month prior to elective surgery and not resumed until at least 2 weeks after hospital discharge following surgery associated with an increased risk of thromboembolism. A reduced efficacy and increased incidence of breakthrough bleeding have been reported in oral contraceptive users treated concomitantly with barbiturates, rifampicin, phenylbutazone, phenytoin or ampicillin. Protracted vomiting and/or diarrhea may decrease the absorption and effectiveness of oral contraceptives. Should these occur, an additional method of contraception should be recommended for the remainder of the cycle.

An increased risk of the following seriously adverse reactions has been associated with the use of oral contraceptives; thrombophlebitis; pulmonary embolism; mesenteric thrombosis; neuro-ocular lesions; myocardial infarction; cerebral thrombosis; cerebral hemorrhage; hypertension; benign hepatic tumors; gall bladder disease, congenital anomalies. The following adverse reactions have also been reported in patients receiving oral contraceptives: nausea and vomiting; gastrointestinal symptoms; breakthrough bleeding and spotting; change in menstrual flow; dysmenorrhea; amenorrhea; temporary infertility; edema; chloasma; melasma; breast changes; weight change; endocervical hyperplasias; diminution in lactation when given immediately postpartum; cholestatic jaundice; migraine; increased size of uterine leiomyomata, rash; mental depression; reduced carbohydrate tolerance; vaginal candidiasis; premenstrual-like syndrome; intolerance to contact lens; change in corneal curvature; cataracts; libido change; chorea; appetite change; cystitis-like syndrome; headache; nervousness; dizziness; hirsutism; loss of scalp hair; erythema multiforme; erythema nodosum; hemorrhagic eruption; vaginitis; porphyria; impaired renal function.

Dosage: - 21 day regimen: 1 tablet daily for 21 days, followed by 7 days without medication.
Cyclic administration.

- 28 day regimen: 1 tablet daily for 21 days, followed by 7 inert green tablets.
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References: 1. Knopp, R.H., Walden, C.E., Wahl, P.W., Hoover, J.J.: "Effects of Oral Contraception on Lipoprotein, Triglyceride and Cholesterol: Relationships to Estrogen and Progestin Potency"; American Journal of Obstetrics and Gynecology, March 1982.

2. Wynn, V., Niththyananthan, R.: "The Effect of Progestins in Combined Oral Contraceptives on Serum Lipids with Special Reference to High-Density Lipoproteins"; American Journal of Obstetrics and Gynecology, March 1982.

3 Spellacy, W.N.: "Carbohydrate Metabolism During Estrogen, Progestogen and Low-Dose Oral Contraceptive Treatment"; American Journal of Obstetrics and Gynecology, March 1982

4. Data on file, Ortho Pharmaceutical (Canada) Ltd.

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MEDICAL ALUMNI ASSOCIATION STUDENT AWARDS

The Medical Alumni Association in addition to supplying direct financial help to graduates and undergraduates, also gives financial support to the Medical Society (Arts & Letters, Yearbook, Orientation) and the Faculty of Medicine (Dean's Fund, Update). Members of the Executive Committee are representative of the alumni on the Admissions Committee (it was through the work of the alumni that admission requirements were changed to consider the 60-40 weighting); two representatives on the Faculty Council; two representatives on the University of Toronto Alumni Association; and two representatives on the College of Electors.

The Student Aid Committee of the University of Toronto Medical Alumni Association has a budget of $63,550 for 1982-83. This money is to be spent as follows:

Scholarships (3 year scholarships of $250 each, and a graduation scholarship of $600)	$ 1,350
Undergraduate Bursaries (This bursary money is awarded through the Faculty Undergraduate Awards Committee)	6,000
Dr. R.E. Haist Award	200
Medical Student Summer Fellowships (Fellowships at $2,200. 2 of these are for Family Practice)	44,000
Medical Student Transportation Fund (This Fund is primarily intended for Medical student electives, although applications for travel connected with work experience are also accepted. The maximum individual grant is $200. Applications for 1983-84 electives are accepted up to April 1, 1983 for the period June 6, 1983 to November 18, 1983, and up to October 1, 1983 for the period November 21, 1983 to May 4, 1984. Late applications will NOT be considered.)	9,000
Fund for Educational Activities	1,000
Not yet assigned	2,000

There are six additional Alumni Association scholarship awards. The **Samuel J. Streight, O.B.E. M.D., Scholarship in Internal Medicine** (value $240) is awarded annually to a student in the final year who has high standing in Internal Medicine.

The **Dr. Delbert S. Hoare Medical Alumni Undergraduate Award.** The principal objective of this Award is the recipient's contribution the "continuing role of the Alumni Association among the undergraduate of the Faculty of Medicine". There are usually two awards given a year with a bronze medal and a cheque for $500.00 each. Dr. **Robert P. Orange Medal & Prize** is an award established by the Class of 6T8 in memory of Dr. Orange. This is given to a student who has "academic achievements, leadership qualities and a commitment to extra-curricular activites both within the medical school and the university." The prize is usually $500.00.

The **Dr. Mary E. Hollington Award** is an award established by the Medical Alumni Association from funds received from Dr. Hollington. The recipients of this award are decided by the graduating class who, in their opinion, was the best teacher in the pre-clinical years and in the final year. These awards are considered at the time of the L.M.C.C. review lectures. The awards consist of a cheque for $1,000 and a suitable citation.

These awards are presented at the Graduation Banquet.

The Association administers two special funds. The **Dr. Bernard A. Manace Award** (value $400) provides assistance to a Medical student from any year who is undertaking an elective or summer Medical experience in Israel. Preference is given to students working in the area of Allergy or Immunology. Consideration is given to academic standing. The **Dr. L. Nelles Silverthorne Award** (value $300) provides assistance to a Medical student from any year who is undertaking an elective or summer Medical experience in a remote area. Preference is given to a student working in a mission hospital. Consideration is given to financial need. The deadline for applications for these two awards is April 1, 1983 for the subsequent 12 month period. As with the Medical Student Transportation Fund, late applications will not be considered.

The Association has four loan funds. The **Dr. Ernest J. Clifford Medical Alumni Association Undergraduate Loan Fund** provides short term, interest free loans to Medical students who requre financial assistance during periods of temporary difficulty. The **Robert Elgin Towle Loan Fund** provides interest free loan assistance to women undergraduates. The **Medical Alumni Association Graduate Loan Fund** (including the **Emma Bissell** and **Agnes E. Hamshaw Funds**) provides interest free loans for physicians taking postgraduate training in Psychiatry. This fund is administered jointly by the Association and the University Department of Psychiatry.

Further information about any of the above, and application forms where required, can be obtained from Mrs. N.S. Shenstone, Secretary, Medical Alumni Assocation at Room 3245, M.S.B., phone 979-1539.